Local cooling for relieving pain from perineal trauma sustained during childbirth (Review)

East CE, Begg L, Henshall NE, Marchant P, Wallace K

THE COCHRANE COLLABORATION®

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2009, Issue 1

http://www.thecochranelibrary.com

TABLE OF CONTENTS

[Intervention Review]

Local cooling for relieving pain from perineal trauma sustained during childbirth

Christine E East[1], Lisa Begg[2], Naomi E Henshall[3], Paul Marchant[4], Karen Wallace[5]

[1]Department of Obstetrics & Gynaecology, University of Melbourne, Parkville, Australia. [2]Maternal and Fetal Medicine, Royal Women's Hospital, Carlton, Australia. [3]Delivery Suite, Royal Hospital for Women, Randwick, Australia. [4]Innovation North , Leeds Metropolitan University, Leeds, UK. [5]Nursing Research Centre including QLD Centre for Evidence Based Nursing & Midwifery (a collaborating centre of The Joanna Briggs Institute)., Mater Health Services, Raymond Terrace, Australia

Contact address: Christine E East, Department of Obstetrics & Gynaecology, University of Melbourne, Royal Women's Hospital, Crn of Grattan St and Flemington Road, Parkville, Victoria, 3052, Australia. eastc@unimelb.edu.au.

Editorial group: Cochrane Pregnancy and Childbirth Group.
Publication status and date: Edited (no change to conclusions), published in Issue 1, 2009.
Review content assessed as up-to-date: 10 July 2007.

Citation: East CE, Begg L, Henshall NE, Marchant P, Wallace K. Local cooling for relieving pain from perineal trauma sustained during childbirth. *Cochrane Database of Systematic Reviews* 2007, Issue 4. Art. No.: CD006304. DOI: 10.1002/14651858.CD006304.pub2.

ABSTRACT

Background

Perineal trauma is common during childbirth and may be painful. Contemporary maternity practice includes offering women numerous forms of pain relief, including the local application of cooling treatments.

Objectives

To evaluate the effectiveness and side effects of localised cooling treatments compared with no treatment, other forms of cooling treatments and non-cooling treatments.

Search strategy

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register (January 2007), CINAHL (1982 to January 2007) and contacted experts in the field.

Selection criteria

Published and unpublished randomised and quasi-randomised trials (RCTs) that compared localised cooling treatment applied to the perineum with no treatment or other treatments applied to relieve pain related to perineal trauma sustained during childbirth.

Data collection and analysis

At least two independent authors performed data extraction for each study. Analyses were performed on an intention-to-treat basis where data allowed. We sought additional information from the authors of three trials.

Main results

Seven published RCTs were included, comparing local cooling treatments (ice packs, cold gel pads or cold/iced baths) with no treatment, hamamelis water (witch hazel), pulsed electromagnetic energy (PET), hydrocortisone/pramoxine foam [Epifoam] or warm baths. The RCTs reported on a total of 859 women. Ice packs provided improved pain relief 24 to 72 hours after birth compared with no treatment (risk ratio (RR) 0.61, 95% confidence interval (CI) 0.41 to 0.91). Women preferred the utility of the gel pads compared with ice packs

or no treatment, although no differences in pain relief were detected between the treatments. None of our comparisons of treatments resulted in differences detected in perineal oedema or bruising. Women reported more pain (RR 5.60, 95% CI 2.35 to 13.33) and used more additional analgesia (RR 4.00, 95% CI 1.44 to 11.13) following the application of ice packs compared with PET.

Authors' conclusions

There is only limited evidence to support the effectiveness of local cooling treatments (ice packs, cold gel pads, cold/iced baths) applied to the perineum following childbirth to relieve pain.

PLAIN LANGUAGE SUMMARY

Local cooling for relieving pain from perineal trauma sustained during childbirth

Perineal tears or cuts are common when having a baby. Women often use a number of methods to relieve the pain, including cold baths, ice or cold packs on the area. Seven studies including 859 women compared cooling treatments such as ice, cold gel pads, or cold bath with no treatment, or other treatments. One study found that women reported less pain 24 to 72 hours after giving birth when they used the ice packs, rather than when they had no treatment. There is only a small amount of evidence of how safe and effective cooling treatments are to relieve perineal pain.

BACKGROUND

Introduction

This review addresses the side effects and effectiveness of the local application of cooling agents to relieve pain from perineal trauma that results from giving birth.

Perineal trauma: effects and prevention

Perineal trauma, whether by episiotomy (cutting of the perineum to enlarge the vaginal orifice during the end of the second stage of birthing) or from naturally occurring tears, is common during childbirth. In Australia in 2003, 43.9% of women sustained tears, 16.1% had an episiotomy and 1.4% had both an episiotomy and tear (Laws 2005). In the United Kingdom, 15% undergo episiotomy and 38% sustain tears (NHS 2005), while episiotomy rates range from 9% to 97% in developing countries such as Zambia and Brazil, respectively (Kropp 2005). The combination of spontaneous tears and episiotomy therefore encompasses a large proportion of women who sustain perineal trauma after giving birth vaginally. Further sources of trauma include vaginal lacerations and trauma to the external genitalia (labia, clitoris, periurethra) (Albers 1999).

In the hours, days and months following childbirth, this trauma may be painful (Albers 1999; Glazener 1995; Sleep 1984). This pain can result in decreased mobility and discomfort with passing urine or faeces (Kapoor 2005; Sultan 2002) and may negatively impact on the woman's ability to care for her new baby (Sleep 1991). Rajan 1994 reported that effective analgesia (pain relief) for perineal discomfort improved breastfeeding rates. Systematic reviews of the effects of topically applied local anaesthetics (for example, lignocaine) and rectally administered analgesia for relief of perineal pain after childbirth considered the potential for perineal pain to impact negatively on the woman's ability to breastfeed and attend her baby's needs; to interfere with overall mother-baby interaction and the experience of motherhood; and to contribute to depression or mental exhaustion (Hedayati 2003; Hedayati 2005). However, no trials evaluated these important outcomes (Hedayati 2003; Hedayati 2005). Perineal pain that persists beyond the immediate postpartum period may warrant further evaluation and may have longer-term effects, such as painful sexual intercourse for up to 18 months after giving birth (Buhling 2006).

Factors associated with perineal trauma include the use of forceps or vacuum to assist the birth, malposition of the fetal head (occiput transverse or posterior), a large baby and birthing a first baby (Albers 1999; Thompson 2002).

Prevention or minimisation of perineal trauma has been proposed as a means of reducing perineal pain associated with childbirth.

Possible preventive or minimisation measures include perineal massage during the pregnancy (Beckmann 2006), mediolateral versus midline episiotomy (Shiono 1990) and birthing attendants' hands on the perineum during the birth of the baby's head, versus hands off (McCandlish 1998), to name a few. Restricting the use of episiotomy to situations where severe perineal trauma would otherwise occur, and for fetal indications, results in less posterior perineal trauma and more anterior tears than routine episiotomy (Carroli 1999). At the time of the systematic review of restricted episiotomy (Carroli 1999), only two trials reported on perineal pain. One large randomised controlled trial reported less perineal pain "at discharge" for women having selective rather than routine episiotomies (Argentine 1993). In contrast, Sleep 1984 found no difference in perineal pain reported by women three days, 10 days or three months postpartum, between routine and restricted episiotomy practices. Others have reported that perineal pain increases with increasing complexity of the trauma (Albers 1999).

Analgesia for perineal trauma

When perineal trauma does occur, regardless of the underlying contributing factors or interventions, pain, where present, requires attention. Contemporary maternity practice includes offering the woman numerous forms of pain relief, often used in combination. Evidence of the effectiveness of existing practices and newer treatments has been systematically reviewed in several Cochrane reviews. These include: methods and materials used for suturing perineal tears or episiotomies (Kettle 1998; Kettle 1999); topically applied anaesthetics (for example, lignocaine) and a topical preparation of pramoxine/hydrocortisone (Hedayati 2005); rectal analgesia (for example, non-steroidal anti-inflammatory drugs) (Hedayati 2003); ultrasound (Hay-Smith 1998) and oral indomethacin (Mason 2004)). While these treatments demonstrate varying levels of success in relieving pain from perineal trauma, they may also involve a degree of cost to the consumer, the health service, or both. Potentially harmful side effects also need to be considered. Concentrations of orally administered non-steroidal anti-inflammatory drugs such as ibuprofen in breastmilk are negligible following short-term therapy (Windle 1989), but maternal consumption of aspirin or non-steroidal anti-inflammatory drugs during pregnancy may contribute to neonatal complications, such as persistent hypertension of the newborn (Van Marter 1996). Consumer satisfaction is also an important consideration of any treatment used for reducing perineal pain (Corkill 2001).

A safe, effective, low-cost alternative, available in primary healthcare settings as well as in hospitals, and that is acceptable to childbearing women, would be attractive. The application of cooling agents, such as ice, may be one such alternative.

Cooling therapy for pain relief

Cooling for short-term pain relief has been used for many years in the treatment of localised tissue trauma (Ernst 1994; McMasters 1977). Steen 1998 reviewed the physiology of local tissue injury and the potential effect of cold therapy; the review is summarised here. Local swelling or accumulation of fluid in an inflamed, injured area occurs due to increased permeability of the dilated peripheral blood vessels. When cold is applied, the skin blood supply is reduced, which may reduce tissue swelling (oedema) and bleeding and therefore reduce bruising and localised pain (Bonica 1990).

Pain signaling, inflammation and vascular changes are influenced by several biochemical mediators. These include serotonin, histamine and kinins. Serotonin dilates capillaries, increases vascular permeability and contracts non-vascular smooth muscle. Actions of histamine include increased capillary permeability, arteriolar dilation and contraction of non-vascular smooth muscle, while kinins increase vascular permeability and vasodilation. Any mechanism that reduces these vascular responses will also reduce the effect of the mediator(s) (Dray 1995).

Heat-activated ion channels or receptors are thought to play a significant role in inflammation-related pain. They are effectively relieved by cooling (Kichko 2004; Reid 2005). Reducing the temperature to the soft tissue by 10 to 15 degrees Celsius (Mac Auley 2001), for example, by applying a cooling treatment, decreases local cell metabolism, reduces the oxygen requirement of the tissue and causes constriction of the peripheral blood vessels. Concern has been expressed about the effect that altering the physiological mechanisms may have on delayed wound healing (Grundy 1997; Walker 1990). To address this concern, Steen 1998 summarised randomised trials of cooling on non-perineal areas, including post-cataract surgery (Hiroshi 1995), total knee arthroplasty (Healy 1994; Levy 1993) and lumbar spine surgery (Brandner 1996). Only one of the trials reported that no adverse effects were attributable to cold therapy (Hiroshi 1995). The remaining trials were not designed to address delays in wound healing. Mac Auley 2001 systematically reviewed trials of cooling for acute soft tissue injury and recommended that applications be made every 10 minutes, rather than continuously, to sustain reduced muscle temperature without causing skin damage, which also allows superficial skin temperature to recover to normal while sustaining the reduction in deep muscle temperature.

The effectiveness and side effects of cooling to relieve pain following childbirth-related perineal trauma have not been systematically evaluated. Despite this, it is widely recommended in clinical practice, second only to oral administration of paracetamol (Sleep 1988). Cooling treatments are applied intermittently in a number of ways, including: (i) solid or crushed ice applied directly to the perineum or between layers of a pad (Grant 1989a); (ii) a gel pack applied to the perineum (Steen 1999); or (iii) bathing (Grant 1989a).

It is important to establish that cooling is effective in relieving

perineal pain and if so, if it is acceptable to women. Additionally, potential side effects or harms need to be identified. For example, freeze or ice burns to the area surrounding the perineum may contribute to unnecessary distress for women (Harris 1992). Cold may induce pain in women with peripheral nerve damage (neuropathy) (Allchorne 2005), although this condition is unlikely to be present in young, healthy, childbearing women.

This review will assess the clinical effectiveness and side effects of cooling therapy to relieve pain from perineal trauma following childbirth.

OBJECTIVES

To evaluate the effectiveness and side effects of localised cooling treatments compared with:

(i) no treatment;

(ii) other cooling treatments; and

(iii) non-cooling treatments applied to the perineum following perineal trauma sustained during childbirth.

To meet this objective, we examined the effect of these treatments on pain, bruising and oedema and considered how each of these affected activities such as daily living, breastfeeding and attending to baby. We also considered other factors, including depression and women's views of and experience with treatments for perineal pain relief.

METHODS

Criteria for considering studies for this review

Types of studies

All published and unpublished randomised and quasi-randomised trials that compared localised cooling treatment(s) applied to the perineum with no treatment or other treatments applied to the perineum to relieve pain related to perineal trauma sustained during childbirth.

Types of participants

Women with perineal trauma (tear or episiotomy, or both) sustained during childbirth.

Types of interventions

Application of localised cooling treatment to the perineum, versus no treatment, or other treatments.

Types of outcome measures

Primary outcomes

(1) Pain, as measured by the trial authors, at the following time periods (or as close to the time period as possible):
(a) within four to six hours of giving birth;
(b) within 24 hours of giving birth;
(c) between 24 and 72 hours of giving birth;
(d) between three and 14 days after giving birth;
(e) three months after giving birth.

Secondary outcomes

(2) Pain, as measured by the trial authors, associated with activities of daily living (for example, sitting, walking, urinating, caring for baby) at the following time periods (or as close to the time period as possible):
(a) within four to six hours of giving birth;
(b) within 24 hours of giving birth;
(c) between 24 and 72 hours of giving birth;
(d) between three and 14 days after giving birth;
(e) three months after giving birth.
(3) Painful sexual intercourse at three months postpartum.
(4) Additional analgesia for relief of perineal pain:
(a) need for and timing of additional analgesia in hospital;
(b) need for and type of additional analgesia after discharge from hospital.
(5) Perineal oedema, as measured by the study authors, at the following time periods (or as close to the time period as possible):
(a) within four to six hours of giving birth;
(b) within 24 hours of giving birth;
(c) between 24 and 72 hours of giving birth;
(d) between three and 14 days after giving birth.
(6) Perineal bruising, as measured by the study authors, at the following time periods (or as close to the time period as possible):
(a) within four to six hours of giving birth;
(b) within 24 hours of giving birth;
(c) between 24 and 72 hours of giving birth;
(d) between three and 14 days after giving birth.
(7) Adverse effects on perineal healing, as measured by the study authors.
(8) Side effects severe enough to discontinue treatment.
(9) Cost of treatment.
(10) Women breastfeeding at:
(a) discharge from postpartum care;
(b) six weeks postpartum.

(11) Adverse effects on mother-baby interactions, as measured by the study authors.
(12) Maternal views and experiences with treatment, as measured by the study authors.
(13) Maternal length of postnatal stay.
(14) Effects on maternal quality of life, as measured by the study authors.
(15) Women with postnatal depression.
(16) Maternal exhaustion, as measured by the study authors, at the following time periods (or as close to the time period as possible):
(a) within 24 hours of giving birth;
(b) between 24 and 72 hours of giving birth;
(c) between three and 14 days after giving birth;
(d) three months after giving birth.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Pregnancy and Childbirth Group's Trials Register by contacting the Trials Search Co-ordinator (January 2007).
The Cochrane Pregnancy and Childbirth Group's Trials Register is maintained by the Trials Search Co-ordinator and contains trials identified from:

1. quarterly searches of the Cochrane Central Register of Controlled Trials (CENTRAL);
2. monthly searches of MEDLINE;
3. handsearches of 30 journals and the proceedings of major conferences;
4. weekly current awareness search of a further 37 journals.

Details of the search strategies for CENTRAL and MEDLINE, the list of handsearched journals and conference proceedings, and the list of journals reviewed via the current awareness service can be found in the 'Search strategies for identification of studies' section within the editorial information about the Cochrane Pregnancy and Childbirth Group.
Trials identified through the searching activities described above are given a code (or codes) depending on the topic. The codes are linked to review topics. The Trials Search Co-ordinator searches the register for each review using these codes rather than keywords.
In addition, we searched CINAHL (1982 to January 2007), using the search strategy: (randomised controlled trial OR controlled clinical trial OR randomized controlled trial) AND (cool* OR cryother* OR cold OR ice) AND (pain OR analges*) AND (perine* OR episiotomy).
We also sought ongoing and unpublished trials by contacting experts in the field.
We did not apply any language restrictions.

Data collection and analysis

Selection of studies

We assessed for inclusion all potential studies identified as a result of the search strategy. There were no differences of opinion requiring resolution by discussion or consultation with an outside person.

Data extraction and management

We designed a form to extract data. At least two review authors extracted each set of data using the agreed form. We would have resolved discrepancies through discussion if there had been any. We double-checked a sub-sample of these data against printouts from Review Manager software (RevMan 2003).
When information regarding any of the above was unclear, we attempted to contact authors of the original reports to provide further details.

Assessment of risk of bias in included studies

We assessed the validity of each study using the criteria outlined in the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2005). Methods used for generation of the randomisation sequence were described for each trial.

(1) Selection bias (randomisation and allocation concealment)

We assigned a quality score for each trial, using the following criteria:
(A) adequate concealment of allocation: such as telephone randomisation, consecutively-numbered, sealed opaque envelopes;
(B) unclear whether adequate concealment of allocation: such as list or table used, sealed envelopes, or study does not report any concealment approach;
(C) inadequate concealment of allocation: such as open list of random number tables, use of case record numbers, dates of birth or days of the week.

(2) Attrition bias (loss of participants, for example, withdrawals, dropouts, protocol deviations)

We assessed completeness to follow up using the following criteria:
(A) less than 5% loss of participants;
(B) 5% to 9.9% loss of participants;
(C) 10% to 19.9% loss of participants;
(D) more than 20% loss of participants.

(3) Performance bias (blinding of participants, researchers and outcome assessment)

We assessed blinding using the following criteria:

1. blinding of participants (yes/no/unclear);
2. blinding of caregiver (yes/no/unclear);
3. blinding of outcome assessment (yes/no/unclear).

Measures of treatment effect

We carried out statistical analysis using the Review Manager software (RevMan 2003). We used fixed-effect meta-analysis for combining data in the absence of significant heterogeneity when trials were sufficiently similar. We explored heterogeneity using sensitivity analysis.

Dichotomous data

For dichotomous data, we presented results as summary risk ratio (relative risk) with 95% confidence intervals.

Dealing with missing data

We analysed data on all participants with available data in the group to which they were allocated, regardless of whether or not they received the allocated intervention. If in the original reports participants were not analysed in the group to which they were randomised, and there was sufficient information in the trial report, we planned to attempt to restore them to the group to which they had been randomised.

Assessment of heterogeneity

We applied tests of heterogeneity between trials, if appropriate, using the I-squared statistic. If we identified high levels of heterogeneity among the trials (exceeding 50%), we explored it by prespecified subgroup analysis and sensitivity analysis. A random-effects meta-analysis was used as an overall summary if considered appropriate.

Subgroup analysis and investigation of heterogeneity

We planned to conduct subgroup analyses classifying whole trials by interaction tests as described by Deeks 2001.
We carried out the following subgroup analyses on the primary outcome for the one trial for which these data were available:

- parity (primiparity, multiparity);
- mode of birth (spontaneous vaginal birth, assisted vaginal birth (forceps, vacuum)).

Sensitivity analysis

We carried out sensitivity analysis to explore the effect of trial quality. This involved analysis based on an A, B, C or D rating of selection bias and attrition bias. We excluded studies of poor quality in the analysis (those rating B, C or D) in order to assess for any substantive difference to the overall result.
The trials reported assessments of pain, oedema and bruising at different time periods and by different criteria, necessitating the use of judgement by the review authors when selecting which assessment would most closely represent our stated outcome measures. We selected the assessment closest to the upper end of the timeframe specified in our outcomes. Where pain was reported as "any" or by degrees, we selected a total of the ratings, for example, moderate, severe and unbearable. We recalculated data from assessment of pain relief "mild/none" in the study by Moore 1989 to provide an estimate of women's pain. For example, where using ice reported ***pain relief*** as mild/none on postnatal day 1, this was considered in our analysis as the ***presence of pain*** . Similarly for oedema and bruising, we included available data for "some" oedema, oedema present, some bruising, bruising present (for example, Moore 1989; The APT Study). The trial by Hill 1989 reported both increased and decreased perineal oedema, but not presence of oedema. Results are therefore presented only in text, as they cannot be compared with those of other studies in meta-analysis form, given our pre-specified outcome measures. One study examined women's self-reported pain with sitting, lying and walking (The APT Study). We selected walking to consider the effect of perineal pain on activities of daily living. Sensitivity analysis using lying or sitting did not alter our conclusions. Some studies had data for several comparisons within this review. We examined these as separate comparisons, for example, ice packs compared with no treatment, then ice packs compared with cold gel pads.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies.
See table of 'Characteristics of included studies'.
The search strategy identified 10 trials involving the use of cooling treatments (ice, cold gel pad, cold bath) for the relief of perineal pain following childbirth, compared with no treatment or other treatments. The trial by Nam 1991 was in Korean, with an English abstract describing a cross-over study, in which 40 women were randomised to have either application of an ice bag, followed by use of a heat lamp, or heat lamp followed by ice bag. The abstract provided no details of event rates. It remains in the section 'Studies awaiting assessment' until a full translation becomes available. One unpublished trial from Mashhad, Iran, was identified (

Mashhad 2007) for which limited details were available. Following correspondence with the lead investigator, we have agreed to await publication before using these findings (see 'Studies awaiting assessment').

LaFoy 1989 and Ramler 1986 reported repeated measures crossover trials involving a total of 60 women randomly allocated to either a cold bath followed by a warm bath, or a warm bath followed by a cold bath. The remaining trials reported outcomes of cooling treatments (ice, cold gel pad or cold bath), no treatment and other treatments for a total of 799 women (Gallie 2003; Hill 1989; Moore 1989; Steen 2000; The APT Study). These numerous comparisons required separate analyses within this review/meta-analysis.

One trial identified in the search was excluded, as it was not randomised (Pinkerton 1961), while a second (Barclay 1983) was excluded on grounds of quality (See table of 'Characteristics of excluded studies').

Risk of bias in included studies

Many of the published trials from the 1980s were poorly reported. Quality of reporting generally improved with more recent trials. Allocation generation was by random-number table (Gallie 2003; Hill 1989), computer (Steen 2000; The APT Study) or not specified (LaFoy 1989; Moore 1989; Ramler 1986). Allocation concealment was by computer registration of the baby's birth in two trials (Steen 2000; The APT Study) and was not specified in the remainder (Gallie 2003; Hill 1989; LaFoy 1989; Moore 1989; Ramler 1986).

Blinding of participants and clinicians was not feasible in the study designs. Blinding of outcome assessors was achieved in two studies (Hill 1989; Ramler 1986), attempted for midwives and achieved for registrars in one study (Moore 1989) and "as far as possible" by Steen 2000. Where both blinded and unblinded assessments were reported, we selected the blinded assessment for this review (Moore 1989).

Loss to follow up

Two trials used data collection forms initiated in the hospital and sent to the community midwives for follow up of the women in their homes (Steen 2000; The APT Study). Despite extensive efforts by the investigators, forms were not returned from the community midwives for 25% of participants in the Steen 2000 study and 29% in the The APT Study study, meaning that no data were available at all for these women. Incomplete data for a further 10% in the study by Steen 2000 were unable to be retrieved by the study authors to enable a more comprehensive analysis. We considered the potential effect of including the reported data in this review, given our original *a priori* plan to consider excluding trials with greater than 20% loss to follow up. The losses to follow up occurred evenly across the study group allocations and related to challenges in obtaining the data forms from the community midwives. We considered that this would potentially contribute less bias than if the losses were different between groups and were related to non-return by participants rather than their clinicians. Additionally, these were the only studies comparing commonly used methods for perineal cooling, and the The APT Study had the largest no treatment comparison of any studies identified for review. Excluding them would potentially remove a considerable amount of data from the limited available data relevant to the review objectives. We therefore included these studies. We will conduct a sensitivity analysis if further similar trials become available for meta-analysis.

Moore 1989 excluded 11% of participants due to protocol violations (13% in the ice group; 7% in the hamamelis water (witch hazel) group and 14% in the pramoxine/hydrocortisone (Epifoam) group). Characteristics of the remaining participants were similar across groups. Of those remaining, up to 23% of those in the Ice and hamamelis water groups had missing data for some outcomes. Given these losses to follow up, we suggest a conservative interpretation of findings from this study. We used sub-totals where these data were meta-analysed with outcomes from other relevant studies.

Effects of interventions

The seven included published RCTs reported on a total of 859 women.

Cooling treatment (ice pack or cold gel pad) versus no treatment

One trial compared the application of **ice packs** to the perineum (n = 107) with no treatment (n = 101) (The APT Study). The group receiving ice packs had statistically significantly less self-reported moderate or severe pain between 24 and 72 hours after giving birth compared with women receiving no treatment (risk ratio (RR) 0.61, 95% confidence interval (CI) 0.41 to 0.91). There were no statistically significant differences in perineal pain at other times; no differences detected in pain affecting activities of daily living (walking), oedema or bruising at any of the time points studied; and no differences in maternal satisfaction with overall perineal care. Wound edge approximation and infection were not statistically significantly different between the ice pack and no treatment groups five days after giving birth. There was no statistically significant difference detected in the use of prescription and non-prescription analgesia between the ice pack and no-treatment groups at any of the time periods measured.

The trial (The APT Study) also compared the application of **cold gel pads (n = 108)** and no treatment (n = 101). There were no statistically significant differences detected in women's self-reported moderate or severe pain at any of the times studied, when using cold gel pads or no treatment. Women were more satisfied

with overall perineal care following use of the gel pads, compared with no treatment (RR 1.11, 95% CI 1.01 to 1.23). No other statistically significant outcomes were detected for the remaining outcomes considered.

Comparison of two cooling treatments (ice packs and cold gel pads)

Two studies compared different forms of cooling therapy: ice packs (n = 129) and cold gel pads (n = 135) (Steen 2000; The APT Study). There were no statistically significant differences detected in perineal pain, pain affecting activities of daily living (walking), oedema or bruising, or of maternal satisfaction with overall perineal care or in wound edge approximation and infection five days after giving birth. Women used more non-prescription analgesia after discharge from hospital, measured 10 days after giving birth, when they had used ice packs, compared with cold gel pads (RR 2.60, 95% CI 1.13 to 5.96). This increase was observed despite the lack of difference in self-reported perineal pain between three and 14 days after giving birth: we had used the data for women's self-reported pain available for day 14; however, using the data on self-reported pain from day 10 did not alter this finding. There was a non-significant trend statistically toward less wound edge gaping at five days post-natal in the ice pack group compared with the gel pad group (RR 0.22, 95% CI 0.05 to 1.01) and no difference in wound infection between the two groups. In both studies women favoured the gel pad rather than the ice packs in terms of their satisfaction with overall perineal care (RR 0.82, 95% CI 0.73 to 0.92) or opinion of treatment effects (RR 0.33, 0.17 to 0.68).

Cooling treatment (ice pack) versus pulsed electromagnetic energy

Gallie 2003 reported that women had statistically significantly more pain 24 to 72 hours following birth when treated with ice packs (n = 50) compared with pulsed electromagnetic energy (PET) (n = 50) (RR 5.60, 95% CI 2.35 to 13.33). This was accompanied by a four-fold increase in the use of additional analgesia (diclofenac) in the ice pack group (RR 4.00, 95% CI 1.44 to 11.13). No data were available for any of the other outcomes of interest.

Cooling treatment (ice pack or cold bath) versus warmth (warm pack or warm bath)

Two cross-over studies considered the effect of cold and warm baths on perineal pain for 60 women (LaFoy 1989; Ramler 1986). LaFoy 1989 reported insufficient details for analysis in this review. The investigators reported that pre- and post-treatment distress scores were not different following either cold or warm treatment and that there was no order effect (cold treatment followed by warm treatment, or warm treatment followed by cold) on perceived distress (LaFoy 1989).

Women reported improved pain relief following a cold bath rather than a warm bath in a small cross-over trial (n = 40) (Ramler 1986). The report did not contain sufficient detail for data entry into RevMan 2003.

Hill 1989 compared REEDA scales (Redness, Edema, Ecchymosis, Discharge, Approximation), which examine several components of the healing process (*see* 'Characteristics of included studies') on women following an episiotomy or laceration, who used cold packs (n = 30), warm packs (n = 30) or warm baths (n = 30). Data were not in a suitable format for meta-analysis; therefore summary data are provided here. Perineal discomfort ratings were not provided, although the report stated that pain scores correlated with REEDA scores. Hill 1989 noted increased perineal oedema within 24 hours of giving birth in one woman in the cold pack group, four women in the warm pack group and three in the warm bath group. Oedema decreased within 24 hours in 13 women in the cold pack group, six in the warm pack group and nine in the warm bath group. Perineal bruising increased within 24 hours of giving birth in none of the cold pack group and one each of the warm pack and warm bath groups. One woman had a superficial haematoma following a fourth-degree laceration and episiotomy. She had used a warm bath prior to allocation to the warm pack group. No data addressed other outcomes of interest in this review.

Cooling treatment (ice pack) versus hamamelis water (witch hazel)

Moore 1989 reported no differences in women reporting none or mild pain relief from treatment with ice packs (n = 69) or hamamelis water (n = 77). The report noted a less than 5% incidence of perineal wound infection or breakdown in the ice pack and hamamelis water groups, with no reported difference between groups. The study did not demonstrate any differences in the use of additional analgesia.

Cooling treatment (ice pack) versus pramoxine/hydrocortisone (Epifoam)

Two studies (Moore 1989; Steen 2000) compared ice packs (n = 91) and pramoxine/hydrocortisone topical aerosol foam (Epifoam) (n = 98). There were no differences in women's self-reported pain at any of the times measured.

The use of ice packs resulted in no difference detected in perineal bruising 24 hours after giving birth, compared with the use of pramoxine/hydrocortisone, although there was significant heterogeneity (I squared = 92.9%) between the two studies. The studies by Moore 1989 and Steen 2000 followed similar protocols and may have been underpowered to detect a clinically meaningful difference. No differences were detected for bruising at other time periods.

There were no differences detected in perineal oedema. Women did not favour one treatment over the other (Steen 2000). Wound

breakdown was reported to occur in less than 5% of participants in each group in one study (Moore 1989). Although Moore 1989 described collection of breastfeeding data at the six-week check, no results were reported for this outcome.

Other outcomes

No trials reported side effects severe enough to discontinue any of the treatments considered in this review. No trials included the outcomes of long-term breastfeeding rates, maternal length of postnatal stay, maternal quality of life, postnatal depression, maternal exhaustion or dyspareunia at the times we prespecified. The APT Study reported no difference detected in women's perceptions that pain interfered with feeding their baby at either three or 10 days after giving birth.

Subgroup analyses

The authors of one study (The APT Study) made data available that allowed conduct of the prespecified subgroup analyses for comparisons of the effectiveness of ice packs, cold gel pads and no treatment. There were no significant differences in women's self-reported perineal pain at any of the times studied for: (i) primiparae compared with multiparae; or (ii) following assisted vaginal birth (forceps, vacuum) compared with unassisted (spontaneous) vaginal birth. Statistically significant interaction was noted for the use of cold gel pads compared with no treatment, for women's self-reported moderate and severe pain within 24 hours of giving birth when spontaneous births were compared with assisted vaginal births (z test -2.05, P = 0.04). There were no other statistically significant interactions (See 'Table 1').

Table 1. Interaction tests for subgroup analyses

Comparison	z statistic	2 sided p-value
ICE PACKS VERSUS NO TREATMENT		
Perineal pain within 24 hours of giving birth (moderate + severe)		
- Primiparous vs multiparous women	-1.266	0.205
- Spontaneous vs assisted vaginal birth	-1.609	0.108
Perineal pain 24 to 72 hours after giving birth (moderate + severe)		

Table 1. Interaction tests for subgroup analyses (*Continued*)

- Primiparous vs multiparous women	0.216	0.829
- Spontaneous vs assisted vaginal birth	-0.084	0.933
COLD GEL PADS COMPARED WITH NO TREATMENT		
Perineal pain within 24 hours of giving birth (moderate + severe)		
- Primiparous vs multiparous women	-0.372	0.710
- Spontaneous vs assisted vaginal birth	-2.051	0.040
Perineal pain 24 to 72 hours after giving birth (moderate + severe)		
- Primiparous vs multiparous women	-0.262	0.794
- Spontaneous vs assisted vaginal birth	-0.639	0.523
ICE PACKS VERSUS COLD GEL PAD		
Perineal pain within 24 hours of giving birth (moderate + severe)		
- Primiparous vs multiparous women	-0.933	0.351
- Spontaneous vs assisted vaginal birth	-0.439	0.661
Perineal pain 24 to 72 hours after giving birth (moderate + severe)		
- Primiparous vs multiparous women	0.446	0.656
- Spontaneous vs assisted vaginal birth	1.228	0.641

DISCUSSION

The methodological quality of some studies was poor, although some of the more recent studies were better reported. Given these limitations, there is some evidence from one small randomised controlled trial (RCT) that cooling treatments (ice packs) improve relief of perineal pain 24 to 72 hours after birth, compared with no treatment (RR 0.61). Women did not report improved pain relief from cold gel pads compared with no treatment. We noted statistically significant interaction in the subgroup analysis of spontaneous compared with assisted vaginal birth, for women's self-reported pain within 24 hours of birth, when using the cold gel pad compared with no treatment. This occurred, in statistical terms, as the result of the effects being in opposite directions for the two groups of women using these treatments. That neither effect was statistically significant brings the statistical and indeed clinical relevance of this finding into doubt and may represent a chance finding, as may be expected when numerous comparisons are made. Comparisons of two cooling treatments (ice pack and cold gel pack) did not favour one over the other for perineal pain relief. One RCT demonstrated that ice packs were less effective than pulsed electromagnetic energy treatment in providing perineal pain relief 24 to 72 hours after giving birth (RR 5.60).

No improvement in analgesia, reduction in bruising or oedema were detected by the use of ice or cold gel pads compared with other treatments that have been reported to be relatively commonly used, such as hydrocortisone/pramoxine and hamamelis water (Sleep 1988). Although women expressed a preference for cold gel pads compared with ice packs, neither treatment provided substantial pain relief, nor did they affect oedema and bruising, mechanisms which at least partly contribute to perineal pain. The use of pulsed electromagnetic energy was superior to ice packs in terms of analgesia and use of additional analgesia in one trial of 100 women, which did not address any of the other outcomes of interest for this review. This therapy may be more appropriate for clinical use than cooling treatments. It is beyond the scope of this review to consider pulsed electromagnetic energy as the most appropriate stand-alone treatment for perineal pain, however, given that other treatments, such as ultrasound, may be even more effective than pulsed electromagnetic energy (Grant 1989b).

Vasoconstriction from cooling may reduce bruising and oedema (Bonica 1990). No treatments evaluated by our meta-analysis (cooling or other) demonstrated differences in perineal bruising or oedema at any of the time points studied. We did not detect differences in perineal oedema and bruising between treatment and no treatment groups at day 14 post natal. However, one trialist (The APT Study) did report between-group differences in perineal oedema at day five and perineal bruising at day 10. Given the statistical chance of finding a significant finding with multiple testing across time, we have only included the result for the latest time point, a decision made prior to examining the data in detail and therefore less subject to bias than including data found to be significant after embarking on the data extraction process. No studies measured tissue temperature at the site of the cooling treatments. It is therefore unclear whether or not body warmth in the perineal region prevented reduction of temperature by 10 to 15 degrees Celsius for ten minutes, as used in other applications of ice following acute soft tissue injury (Mac Auley 2001). The limited analgesic effect and lack of reduction in bruising and oedema from the use of cooling treatments in this review suggest that either: (i) cooling is ineffective for use in perineal trauma following childbirth; or (ii) inadequate cooling is achieved with currently available techniques. Additionally, improved analgesic effect and reduction in oedema and bruising may be possible with prolonged use of cooling, rather than the 10 to 20 minutes used in these studies. In clinical practice, this likely reflects the length of time taken for ice packs or gel pads to warm to body temperature.

Few trials evaluated maternal satisfaction with treatment. While women did not express any difference in satisfaction with perineal care between the use of ice packs and no treatment, they did favour the use of a cold gel pad over ice packs. The impact of this assessment remains uncertain, given that women did not rate their pain relief differently. It appears that the method by which treatment is delivered is at least as important to women as is the impact of that treatment on its intended effect, in this case, relief of perineal pain.

The use of cooling treatments did not result in less use of additional analgesia than no treatment, hamamelis water or hydrocortisone/pramoxine. One study reported that the use of ice packs resulted in increased use of additional analgesia, compared with pulsed electromagnetic energy (Gallie 2003). A comparison of two cooling treatments demonstrated that more non-prescription analgesia was used 10 days after giving birth when ice packs were used, compared with cold gel pads (RR 2.92).

Note that as a number of meta-analyses have been conducted, there is an increased chance of spuriously finding statistically significant effects, as a result of this multiplicity. Also, it is recognised that, because the same trial appears in different meta-analyses at different time points (for example, The APT Study), the results of the meta-analyses are not fully independent.

Cold gel pads or ice packs may be more accessible in developing nations and publicly funded health facilities in industrialised countries than either additional oral analgesic agents or pulsed electromagnetic energy. Should a simple, inexpensive and possibly only marginally effective treatment, or even no treatment at all, be considered for the majority, rather than effective but more expensive treatments that are available only to a few?

Despite frequent references in the literature to the detrimental

effect of perineal pain on mother-baby interaction, only one study examined this outcome, with no reports of differences in pain that interfered with breastfeeding when ice packs, cold gel pads or no treatment were used for relief of perineal pain (The APT Study). Only one study reported maternal pain associated with activities of daily living (walking) and found that, while the majority of women did report pain, there were no between-group differences (The APT Study).

AUTHORS' CONCLUSIONS

Implications for practice

Studies included in this review involved the use of cooling treatments for 10 to 20 minutes, with no adverse effects noted. These findings from relatively small numbers of women provide some support for the safety of cooling treatments for up to 20 minutes, reflecting common clinical practice.

The search for the best clinical approach for reducing perineal pain following childbirth has not been answered by the evidence for cooling treatments. It is likely that concurrent use of several treatments is required to adequately address this issue, including bathing, topical lignocaine, prescription and non-prescription analgesia, ultrasound or pulsed electromagnetic energy (Sleep 1988). Current evidence to support the efficacy of some of these treatments is also limited. However, their use, as for ice packs, remains relatively common (Sleep 1988).

Implications for research

The effectiveness of cooling treatments for relief of perineal pain may be better assessed in future and larger studies by: (i) improved reporting of treatment regimes, parity, method of birth and degree of perineal trauma; consideration of women's satisfaction with treatment, ease of use, costs, breastfeeding, interaction with the baby and postnatal depression; and outcome assessor blinding for evaluation of oedema and bruising. Further research may determine the degree of cooling achieved by current techniques. If these techniques fail to reduce perineal temperature by 10 to 15 degrees, more effective cooling agents may need to be developed. Future studies may consider the effects of replacing the cooling device every 10 to 15 minutes, while also considering potential adverse effects of prolonged cooling.

Given the limited evidence to support the use of cooling treatments and the general lack of effective alternatives compared with cooling identified in this review, future studies may ethically consider the use of a no-topical treatment group to compare the potential effectiveness of agents that provide a greater degree of cooling that can be sustained for longer than current methods.

ACKNOWLEDGEMENTS

We acknowledge Mary Steen and Michelle Briggs for a previous version of the protocol, which was also authored by Paul Marchant. We thank Philippa Middleton for her helpful assistance in compiling the protocol and the review.

As part of the pre-publication editorial process, this review has been commented on by three peers (an editor and two referees who are external to the editorial team), one or more members of the Pregnancy and Childbirth Group's international panel of consumers and the Group's Statistical Adviser.

REFERENCES

References to studies included in this review

Gallie 2003 ***{published data only}***
Gallie M, Pourghazi S, Grant JM. A randomized trial of pulsed electromagnetic energy compared with ice-packs for the relief of postnatal perineal pain. *Journal of the Association of Chartered Physiotherapists in Women's Health* 2003;**93**:10–4.

Hill 1989 ***{published data only}***
Hill PD. Effects of heat and cold on the perineum after episiotomy/laceration. *Journal of Obstetric, Gynecologic and Neonatal Nursing* 1989;**18**(2):124–9.

LaFoy 1989 ***{published data only}***
LaFoy J, Geden E. Postepisiotomy pain: warm versus cold sitz bath. *Journal of Obstetric, Gynecologic and Neonatal Nursing* 1989;**18**(5):399–403.

Moore 1989 ***{published data only}***
Moore W, James DK. A random trial of three topical analgesic agents in the treatment of episiotomy pain following instrumental vaginal delivery. *Journal of Obstetrics and Gynaecology* 1989;**10**:35–9.

Ramler 1986 ***{published data only}***
Ramler D, Roberts J. A comparison of cold and warm sitz baths for relief of postpartum perineal pain. *Journal of Obstetric, Gynecologic and Neonatal Nursing* 1986;**15**(6):471–4.

Steen 2000 ***{published data only}***
Griffith-Jones M, Steen M, Walker J, Cooper K. Randomised controlled trial of a new maternity cooling gel pad against ice packs and epifoam in the management of perineal oedema, bruising and pain after instrumental vaginal delivery. *British Journal of Obstetrics and Gynaecology* 1998;**105**(Suppl 17):88.
Steen M, Cooper K. Perineal trauma: a localised cooling treatment for alleviating perineal oedema, bruising and pain following an episiotomy. "What works": research and practice in nursing; 1998 June 25; Leeds, UK. 1998.
* Steen M, Cooper K, Marchant P, Griffiths-Jones M, Walker J. A randomised controlled trial to compare the effectiveness of icepacks

and epifoam with cooling maternity gel pads at alleviating postnatal perineal trauma. *Midwifery* 2000;**16**:48–55.

The APT Study ***{published and unpublished data}***

* Steen M. A randomised controlled trial to evaluate the effectiveness of localised cooling treatments in alleviating perineal trauma: the APT study. *MIDIRS Midwifery Digest* 2002;**12**(3): 373–6.

Steen M, Marchant P. Alleviating perineal trauma - the APT study. *RCM Midwives Journal* 2001;**4**(8):256–8.

Steen M, Marchant P. Ice packs and cooling gel pads versus no localised treatment for relief of perineal pain: a randomised controlled trial. *Evidence Based Midwifery* 2007;**5**(1):16–22.

References to studies excluded from this review

Barclay 1983 ***{published data only}***

Barclay L, Martin N. A sensitive area (Care of the episiotomy in the post-partum period). *Australian Journal of Advanced Nursing* 1983; **1**(1):12–9.

Pinkerton 1961 ***{published data only}***

Pinkerton JHM, Beard RW. Ice-packs after episiotomy. *BMJ* 1961; **1**:1536–7.

References to studies awaiting assessment

Mashhad 2007 ***{unpublished data only}***

Adedian Z, NavabiRigi SHD, Poorjavad M, Esmaili H, Steen MP. A randomized controlled trial to compare the effectiveness of cooling gel pads and ice pack on intensity perineal pain after episiotomy in primiparous women. Personal communication 2007.

Nam 1991 ***{published data only}***

Nam HK, Park YS. A study on comparisons of ice bag and heat lamp for the relief of perineal discomfort. *Kanho Hakhoe Chi* 1991; **21**(1):27–40.

Additional references

Albers 1999

Albers L, Garcia J, Renfrew M, McCandlish R, Elbourne D. Distribution of genital tract trauma in childbirth and related postnatal pain. *Birth* 1999;**26**(1):11–5.

Allchorne 2005

Allchorne AJ, Broom DC, Woolf CJ. Detection of cold pain, cold allodynia and cold hyperalgesia in freely behaving rats. *Molecular Pain* 2005;**14**(1):36.

Argentine 1993

Argentine Episiotomy Trial Collaborative Group. Routine vs selective episiotomy: a randomised controlled trial. *Lancet* 1993; **342**:1517–8.

Beckmann 2006

Beckmann MM, Garrett AJ. Antenatal perineal massage for reducing perineal trauma. *Cochrane Database of Systematic Reviews* 2006, Issue 1. [Art. No.: CD005123. DOI: 10.1002/ 14651858.CD005123.pub2]

Bonica 1990

Bonica JJ. *The management of pain*. 2nd Edition. Philadelphia: Lea and Felbinger, 1990:1775–6.

Brandner 1996

Brandner B, Munro B, Bromby LM, Hetreed M. Evaluation of the contribution to post-operative analgesia by local cooling of the wound. *Anaesthesia* 1996;**51**:1021–5.

Buhling 2006

Buhling KJ, Schmidt S, Robinson JN, Klapp C, Siebert G, Dudenhausen JW. Rate of dyspareunia after delivery in primiparae according to mode of birth. *European Journal of Obstetrics & Gynecology and Reproductive Biology* 2006;**124**:42–6.

Carroli 1999

Carroli G, Belizan J. Episiotomy for vaginal birth. *Cochrane Database of Systematic Reviews* 1999, Issue 3. [Art. No.: CD000081. DOI: 10.1002/14651858.CD000081]

Corkill 2001

Corkill A, Lavender T, Walkinshaw SA, Alfirevic Z. Reducing postnatal pain from perineal tears by using lignocaine gel: a double-blind randomized trial. *Birth* 2001;**28**(1):22–7.

Deeks 2001

Deeks JJ, Altman DG, Bradburn MJ. Statistical methods for examining heterogeneity and combining results from several studies in meta-analysis. In: Egger M, Davey Smith G, Altman DG editor (s). *Systematic reviews in health care: meta-analysis in context*. London: BMJ Books, 2001.

Dray 1995

Dray A. Inflammatory mediators of pain. *British Journal of Anaesthesia* 1995;**75**:125–31.

Ernst 1994

Ernst E, Fialka V. Ice freezes pain? A review of the clinical effectiveness of analgesic cold therapy. *Journal of Pain and Symptom Management* 1994;**9**(1):56–9.

Glazener 1995

Glazener C, Abdalla M, Stroud P, Naji S, Templeton A, Russell I. Postnatal maternal morbidity: extent, causes, prevention and treatment. *British Journal of Obstetrics and Gynaecology* 1995;**102**: 282–7.

Grant 1989a

Grant A, Sleep J. Relief of perineal pain and discomfort after childbirth. In: Chalmers I, Enkin M, Keirse MJNC editor(s). *Effective care in pregnancy and childbirth*. Vol. **2**, Oxford: Oxford Univesity Press, 1989:1347–58.

Grant 1989b

Grant A, Sleep J, McIntosh J, Ashurst H. Ultrasound and pulsed electromagnetic energy treatment for perineal trauma. A randomized placebo-controlled trial. *British Journal of Obstetrics and Gynaecology* 1989;**96**:434–9.

Grundy 1997

Grundy L. The role of the midwife in perineal wound care following childbirth. Wound Care Clinic. *British Journal of Nursing* 1997;**6**(10):585–8.

Harris 1992

Harris M. The impact of research findings on current practice in relieving postpartum perineal pain in a large district general hospital. *Midwifery* 1992;**8**:125–31.

Hay-Smith 1998
Hay-Smith EJC. Therapeutic ultrasound for postpartum perineal pain and dyspareunia. *Cochrane Database of Systematic Reviews* 1998, Issue 3. [Art. No.: CD000495. DOI: 10.1002/14651858.CD000495]

Healy 1994
Healy WL, Seidman J, Pfeifer BA, Brown DG. Cold compressive dressing after total knee arthroscopy. *Clinical Orthopaedics and Related Research* 1994;**299**:143–6.

Hedayati 2003
Hedayati H, Parsons J, Crowther CA. Rectal analgesia for pain from perineal trauma following childbirth. *Cochrane Database of Systematic Reviews* 2003, Issue 3. [Art. No.: CD003931. DOI: 10.1002/14651858.CD003931]

Hedayati 2005
Hedayati H, Parsons J, Crowther CA. Topically applied anaesthetics for treating perineal pain after childbirth. *Cochrane Database of Systematic Reviews* 2005, Issue 2. [Art. No.: CD004223. DOI: 10.1002/14651858.CD004223.pub2]

Higgins 2005
Higgins JPT, Green S, editors. Cochrane Handbook for Systematic Reviews of Interventions 4.2.4 [updated March 2005]. In: The Cochrane Library, Issue 2, 2005. Chichester, UK: John Wiley & Sons, Ltd.

Hiroshi 1995
Hiroshi F, Yukiko Y, Ikuko T, Jun S, Kazuo T. Increased comfort after cataract surgery. *American Journal of Opthalmology* 1995;**119**(3):301–6.

Kapoor 2005
Kapoor DS, Thakar R, Sultan AH. Combined urinary and faecal incontinence. *International Urogynecology Journal and Pelvic Floor Dysfunction* 2005;**16**(4):321–8.

Kettle 1998
Kettle C, Johanson RB. Continuous versus interrupted sutures for perineal repair. *Cochrane Database of Systematic Reviews* 1998, Issue 1. [Art. No.: CD000947. DOI: 10.1002/14651858.CD000947]

Kettle 1999
Kettle C, Johanson RB. Absorbable synthetic versus catgut suture material for perineal repair. *Cochrane Database of Systematic Reviews* 1999, Issue 4. [Art. No.: CD000006. DOI: 10.1002/14651858.CD000006]

Kichko 2004
Kichko TI, Reeh PW. Why cooling is beneficial: non-linear temperature-dependency of stimulated iCGRP release from isolated rat skin. *Pain* 2004;**110**:215–9.

Kropp 2005
Kropp N, Hartwell T, Althabe F. Episiotomy rates from eleven developing countries. *International Journal of Gynecology & Obstetrics* 2005;**91**:157–9.

Laws 2005
Laws PJ, Sullivan EA. *Australia's mothers and babies 2003. AIHW Cat. No. PER 29*. Sydney: AIHW National Perinatal Statistics Unit (Perinatal Statistics Series No. 16), 2005.

Levy 1993
Levy AS, Marmar E. The role of cold compression dressing in the post-operative treatment of total knee arthroscopy. *Clinical Orthopaedics and Related Research* 1993;**297**:174–8.

Mac Auley 2001
Mac Auley DC. Ice therapy: how good is the evidence?. *International Journal of Sports Medicine* 2001;**22**(5):379–84.

Mason 2004
Mason L, Edwards J, Moore RA, McQuay HJ. Single dose oral indometacin for the treatment of acute postoperative pain. *Cochrane Database of Systematic Reviews* 2004, Issue 4. [Art. No.: CD004308. DOI: 10.1002/14651858.CD004308.pub2]

McCandlish 1998
McCandlish R, Bowler U, van Asten H, Berridge G, Winter C, Sames L, et al.A randomised controlled trial of care of the perineum during second stage of normal labour. *British Journal of Obstetrics and Gynaecology* 1998;**105**(12):1262–72.

McMasters 1977
McMasters WC. A literary review on ice therapy in injuries. *American Journal of Sports Medicine* 1997;**5**(3):124–6.

NHS 2005
Government Statistical Service. NHS Maternity Statistics, England: 2003-04. http://www.dh.gov.uk/assetRoot/04/10/70/61/04107061.pdf 2005 (accessed 10 May 2006):1–45.

Rajan 1994
Rajan L. The impact of obstetric procedures and analgesia/anaesthesia during labour and delivery on breast feeding. *Midwifery* 1994;**10**(2):87–103.

Reid 2005
Reid G. ThermoTRP channels and cold sensing: what are they and what do they do?. *European Journal of Physiology* 2005;**451**:250–63.

RevMan 2003
The Nordic Cochrane Centre, The Cochrane Collaboration. Review Manager (RevMan). 4.2 for Windows. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2003.

Shiono 1990
Shiono P, Klebanoff MA, Carey JC. Midline episiotomies: more harm than good?. *Obstetrics & Gynecology* 1990;**75**(5):765–70.

Sleep 1984
Sleep J, Grant A, Garcia J, Elbourne D, Spencer J, Chalmers I. West Berkshire perineal management trial. *British Medical Journal (Clinical Research Edition)* 1984;**289**(6445):587–90.

Sleep 1988
Sleep J, Grant A. Relief of perineal pain following childbirth: a survey of midwifery practice. *Midwifery* 1988;**4**:118–22.

Sleep 1991
Sleep, J. Perineal care: a series of five randomized controlled trials. *Midwives, research and childbirth*. Vol. **2**, London: Chapman and Hall, 1991:199–251.

Steen 1998
Steen M, Cooper K. Cold therapy and perineal wounds: too cool or not too cool?. *British Journal of Midwifery* 1998;**6**(9):572–9.

Steen 1999

Steen M, Cooper K. A new device for the treatment of perineal wounds. *Journal of Wound Care* 1999;**8**(2):87–90.

Sultan 2002

Sultan AH, Thakar R. Low genital tract and anal sphincter trauma. *Best Practice & Research. Clinical Obstetrics & Gynaecology* 2002;**16** (1):99–115.

Thompson 2002

Thompson JF, Roberts CL, Currie M, Ellwood DA. Prevalence and persistence of health problems after childbirth: associations with parity and method of birth. *Birth* 2002;**29**(2):83–94.

Van Marter 1996

Van Marter LJ, Leviton A, Allred EN, Pagano M, Sullivan KF, Cohen A, et al.Persistent pulmonary hypertension of the newborn and smoking and aspirin and nonsteroidal antiinflammatory drug consumption during pregnancy. *Pediatrics* 1996;**97**(5):658–63.

Walker 1990

Walker P. Episiotomy: issues for practice. Wound care. *Nursing* 1990;**4**(15):18–22.

Windle 1989

Windle ML, Booker LA, Rayburn WF. Postpartum pain after vaginal delivery. A review of comparative analgesic trials. *Journal of Reproductive Medicine* 1989;**34**(11):891–5.

* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Gallie 2003

Methods	RCT, n = 100. Random-number table used to generate sequence, block size of 20, opaque envelopes (all accounted for).
Participants	Inclusion criteria: women following vaginal delivery in the previous 24 hours, who complained of perineal pain and gave consent. Exclusion criteria: no perineal pain.
Interventions	Ice pack group (n = 50): ice packs (Articare Instant Cold Packs, Beirsdorf, Hamburg, Germany) given to women by primary author who instructed on their use (per manufacturer directions). Packs applied for 10-15 min every 3-4 hours. Pulsed electromagnetic energy therapy group (n = 50): Megapulse Therapy Unit (Electromedical Supplies, Greenham Ltd, Wantage, Oxfordshire, UK). High-frequency electromagnetic pulses (27.12 MHz) delivered to perineum at 100 pulses per second. Treatment for 10 min, repeated 6 hours later and next morning. Both groups: escape analgesia - oral diclofenac. Prior to treatment: instructed on pelvic floor exercises; advised on sitting posture.
Outcomes	Perineal pain rated by women on ordinal scale (none, mild, moderate, severe, unbearable) prior to treatment, then 6, 12, 24 and 30 hours after treatment. Use of escape analgesia.
Notes	Study location: Bellshill Maternity Hospital, Lanarkshire, United Kingdom The authors noted that the majority of women who did not have an episiotomy or perineal trauma did not complain of perineal pain and were therefore not included in the study.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

Hill 1989

Methods	RCT, n = 90. Random-number table used for group allocation. No further details provided. Intention to treat not stated. Obstetric nurse research assistants who conducted the perineal assessment were blinded to treatment allocation.
Participants	Inclusion criteria: episiotomy or laceration, or both, requiring suturing. Some degree of perineal discomfort. Willing to participate and able to co-operate with instructions.
Interventions	Treatments were applied once within 24 hours of delivery for 20 min. Previous analgesia/treatment was documented but not reported. Warm pack group (n = 30): "extra absorbent" warm pack activated by breaking inner bubble containing

Hill 1989 (*Continued*)

	chemicals. Reached 110 degrees F (43 degrees C). Cold pack group (n = 30): "extra absorbent" cold pack activated by breaking inner bubble containing chemicals. Cooled to 32 degrees F (0 degrees C). Warm sitz bath (n = 30): built-in sitz tub with continuously flowing water. Temperature 98 to 102 degrees F (36.7 to 38.9 degrees C) prior to getting into bath.
Outcomes	Perineal assessment before treatment and 2 hours following treatment by 1 of 2 obstetric nurse research assistants, blinded to group assignment (same assessor for each participant). REEDA Score, including assessment of oedema, redness, ecchymosis, approximation and discharge. Participants rated their perineal discomfort prior to, immediately following and 30 min, 1 hour and 2 hours following treatments (these results not reported).
Notes	Study location: A "midwestern community hospital", Illinois, United States. No loss of follow up stated. Research funded by American Pharmaseal Company, Baxter Healthcare Corporation. It is unclear whether or not the sponsors also manufactured the cold and warm packs.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

LaFoy 1989

Methods	Cross-over trial, n = 20. Consenting women randomly assigned order of treatments - method of allocation generation and allocation concealment not reported. Participants not blinded to group allocation. No details of whether outcome assessments were blinded to group allocation.
Participants	Inclusion criteria: consented, English speaking, episiotomy, received only local anaesthetic, reported at least some degree of perineal pain, no known mental disorder, no history of pre-eclampsia, immunologic disorders or cold allergy.
Interventions	Group 1: cold bath between 6 and 24 hours of delivery, followed by warm bath 24 hours later. Group 2: warm bath between 6 and 24 hours of delivery, followed by cold bath 24 hours later. Participants sat for 15 minutes in portable sitz tub filled with tap water. Cold bath: ice added until the temperature dropped to zero degrees C (32 degrees F) and was maintained during treatment by adding more ice water as required. Warm bath: warm water was added from a bag/tubing arrangement, to 43 degrees C (110 degrees F). Water temperature was maintained during treatment by adding warm water as required.
Outcomes	Visual analogue scale used by women to rate sensation and distress with perineal pain. Ratings made before and immediately after treatment. Perineal oedema and haematoma graded from 0 = none to 3 = extensive by nurses. Inter-rater agreement of staff nurses' grading of 9 cases of oedema (83%) and haematoma (77%). Gradings made immediately before and after treatment.

LaFoy 1989 (*Continued*)

Notes	Study location: A "midwestern university medical center", Columbia, United States. No loss to follow up. All women routinely applied ice packs to the perineum during the recovery room phase only. Treatment postponed until at least 3 hours after any analgesia. Analgesia usage not reported. All participants completed both treatments.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Moore 1989

Methods	RCT, n = 300. No details of randomisation allocation generation or allocation concealment provided. Blinding: participant, no; midwife assessor, attempted but not always possible; registrar, day 5 assessment blinded to treatment allocation; postnatal doctor (at 6 weeks) blinded to treatment allocation. Not intention to treat - excluded if did not follow protocol (n = 34, 11%).
Participants	Inclusion criteria: women following episiotomy and forceps birth.
Interventions	Ice pack group (n = 87): no details of ice usage provided. Pramoxine/hydrocortisone topical aerosol foam (Epifoam) group (n = 86): sprayed directly on the episiotomy, covered with non-adherent pad. Hamamelis water (witch hazel) (n = 93): no details provided. The first and subsequent treatment application was demonstrated by a midwife. Women could use oral paracetamol and salt baths as required.
Outcomes	Daily questionnaire to woman about pain relief, number of salt baths, use of analgesia, number of treatment applications. Midwife examination daily of bruising, oedema, wound breakdown and infection. Registrar examination day 5 (blinded) of bruising, oedema, wound infection and wound breakdown. Postnatal (6 week) (blinded) when commenced intercourse, how long after birth before pain free, wound, feeding method (no event rates reported).
Notes	Study location: Southmead Hospital, Bristol, United Kingdom. Loss to follow up (after exclusions for protocol violation): n = 61 missing some data (23% of 266), leaving 205 with full data. Postnatal check, further loss to follow up of 79 participants (38% of 205). Financial support from Stafford Miller acknowledged. It is unclear if this company may or may not be manufacturers of either Hamamelis water or Epifoam.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Ramler 1986

Methods	Cross-over trial, n = 40. Random assignment, with no details of method of allocation generation or allocation concealment. Participant and clinician not blinded. The nurse investigator who asked the women to rate their pain was blinded to group allocation.
Participants	Inclusion criteria: postpartum, with an episiotomy.
Interventions	Group 1: cold bath, followed by warm bath 6 hours later. Group 2: warm bath, followed by cold bath 6 hours later. Participants sat for 20 min in a built-in sitz tub filled with tap water. Cold bath: cold tap water added until temperature dropped to between 15.6 and 18.3 degrees C (60 and 65 degrees F). Temperature maintained by adding more cold water as required. Warm bath: warm tap water added until temperature reached between 36.7 and 44.4 degrees C (98 and 112 degrees F). Water temperature maintained by adding warm water as required. Baths were taken within the second 24 hours after delivery.
Outcomes	Women rated pain from 0 = no pain to 5 = extreme pain, before each bath, immediately after, then 30 min and one hour after each bath.
Notes	Study location: Not identified in the report. Authors are from: (i) 97th General Hospital, Frankfurt, Germany; and (ii) University of Colorado Health Science Centre, United States. Treatment postponed until at least 3 hours after any analgesia. Analgesia usage not reported. No loss to follow up.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	B - Unclear

Steen 2000

Methods	RCT, n = 120. Allocation generation by computer. Women allocated to group by computer when registering birth details. Outcome assessors blinded to treatment group "as far as possible".
Participants	Inclusion criteria: women, 20-35 years, English-speaking, primigravid, term fetus, cephalic presentation, instrumental delivery, episiotomy sutured with Vicryl. Exclusion criteria: any medical disorder, retained placenta, multiple pregnancy.
Interventions	Group 1: ice packs (n = 38). Normal saline sachets frozen prior to use, covered with sterile gauze prior to use. Group 2: pramoxine/hydrocortisone topical aerosol foam (Epifoam) (n = 42), a steroidal anti-inflammatory. Foam placed on sterile gauze and applied directly to perineum. Group 3: cold gel pads (n = 40). Developed by a midwife and an obstetrician specifically for the trial. High thermal capacity cellulose-based gel plus propylene glycol anti-freeze within a heat-welded soft plastic sachet. Measured 5 x 23 x 1.5 cm. Frozen prior to use. Reusable by the individual. Covered in sterile gauze before use. For all groups, women chose (i) the initial time of application, within 4 hours of suturing; and (ii) how

Steen 2000 (*Continued*)

	many times treatment was reapplied for up to 48 hours after suturing. Unpublished information from the authors noted that gel pad groups took 20 min to warm to perineal temperature, compared with ice packs, which melted more quickly.
Outcomes	Perineal oedema and bruising assessed within 4 hours of suturing and at 24 and 48 hours. Wherever possible, the same midwife made the assessments for each woman. Perineal healing assessed at 5 and 10 days after giving birth. Pain self-assessed using 10-point visual analogue scale within first 4 hours, then at 24 and 48 hours, with assistance from the midwife assessors; then at 5 days by community midwives. At day 5, the community midwives asked the women to complete a 5-point rating of their opinions of the benefits of treatments.
Notes	Study location: St James University Hospital, Leeds, United Kingdom. A single data collection record contained all details and outcomes for each woman: if the record was not returned, all details for that participant were unavailable for analysis. Non-returned data collection forms accounted for 25% of the overall sample (30 of 120), distributed evenly between the 3 groups. A further 11 exclusions and 2 refusals occurred postrandomisation and were excluded due to advice received at the time of analysis. The author attempted to provide these data for this review but was unable to do so. All losses accounted for 36% of the original sample. Information was sought and provided about the length of time that ice packs or gel pads were in place. 12 experienced, hospital-based midwives underwent training in the use of a visual assessment tool for oedema and bruising, with significant inter-rater reliability. Perineal pain assessed by 10-point visual analogue scale. Women rated benefits of treatment on a 5-point ordinal rating scale.

Risk of bias

Item	**Authors' judgement**	**Description**
Allocation concealment?	Yes	A - Adequate

The APT Study

Methods	RCT, n = 450. Random sequence, computer-generated, block size of 15. Women allocated to group by computer when registering birth details on computer. Participants and clinicians unblinded to treatment. Intention-to-treat analysis.
Participants	Inclusion criteria: women aged 16-45 years, English speaking, cephalic presentation, term, singleton fetus, normal or instrumental birth, episiotomy or second degree perineal tear sutured with Vicryl Rapide.
Interventions	Ice pack group (n = 150): normal saline sachets frozen, covered with sterile gauze prior to use. Cold gel pad group (n = 150): maternity gel pads developed for the trial by a midwife and an obstetrician. Made from high thermal capacity cellulose-based gel plus propylene glycol anti-freeze, within a heat welded soft plastic sachet. Frozen prior to use and reusable by the individual. Covered with sterile gauze prior to use. No treatment group (n = 150): no application of ice packs or gel pads. All groups bathed and used additional analgesia as required.

The APT Study (*Continued*)

Outcomes	Self-assessed pain, midwives' assessments of bruising, oedema, wound healing; maternal satisfaction.
Notes	Study location: St James University Hospital, Leeds, United Kingdom. Additional information was sought and provided by the authors about blinding of assessors, whether the initial assessment was undertaken prior to treatment allocation and rates of wound healing. Raw data was sought and provided that allowed calculation of event rates for pain that interfered with breastfeeding and for the subgroup analyses.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Yes	A - Adequate

C: Celcius
F: Farenheit
min: minute
RCT: randomised controlled trial
REEDA: Redness, Edema, Ecchymosis, Discharge, Approximation
Numbers included in trials here represent the total enrolled and may differ from numbers ultimately reported by the authors of trials.

Characteristics of excluded studies *[ordered by study ID]*

Barclay 1983	This quasi-randomised trial has many potential biases. Group allocation was by admission to 1 of 5, 4-bed areas of the postnatal ward. Communication with the author confirmed that midwives and women refused some treatments and requested the use of iced bath. This resulted in some withdrawals from analysis and uneven numbers in the treatment groups. There were few data available on the outcomes of interest for this review. Therefore, excluding this trial is appropriate in terms of quality, and does not diminish the amount of data relevant to this review.
Pinkerton 1961	This letter to the Editor described the use of an ice-pack and is not a randomised controlled trial.

DATA AND ANALYSES

Comparison 1. Cooling treatment (ice pack) versus no treatment

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Perineal pain within 24 hours of giving birth	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 Moderate + severe pain: all women	1	208	Risk Ratio (M-H, Fixed, 95% CI)	1.00 [0.77, 1.30]
1.2 Moderate + severe pain: primiparous women	1	128	Risk Ratio (M-H, Fixed, 95% CI)	0.9 [0.68, 1.20]
1.3 Moderate + severe pain: multiparous women	1	80	Risk Ratio (M-H, Fixed, 95% CI)	1.36 [0.77, 2.42]
1.4 Moderate + severe pain: spontaneous vaginal birth	1	157	Risk Ratio (M-H, Fixed, 95% CI)	1.14 [0.81, 1.60]
1.5 Moderate + severe pain: assisted vaginal birth	1	51	Risk Ratio (M-H, Fixed, 95% CI)	0.75 [0.51, 1.09]
2 Perineal pain 24 to 72 hours after giving birth	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 Moderate + severe pain: all women	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.61 [0.41, 0.91]
2.2 Moderate + severe pain: primiparous women	1	128	Risk Ratio (M-H, Fixed, 95% CI)	0.63 [0.40, 1.00]
2.3 Moderate + severe pain: multiparous women	1	80	Risk Ratio (M-H, Fixed, 95% CI)	0.57 [0.26, 1.25]
2.4 Moderate + severe pain: spontaneous vaginal birth	1	157	Risk Ratio (M-H, Fixed, 95% CI)	0.61 [0.36, 1.02]
2.5 Moderate + severe pain: assisted vaginal birth	1	51	Risk Ratio (M-H, Fixed, 95% CI)	0.59 [0.33, 1.06]
3 Perineal pain between 3 and 14 days after giving birth	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
3.1 Moderate + severe pain: all women: Day 14	1	208	Risk Ratio (M-H, Fixed, 95% CI)	2.83 [0.12, 68.76]
3.2 Moderate + severe pain: primiparous women: Day 14	1	128	Risk Ratio (M-H, Fixed, 95% CI)	3.0 [0.12, 72.29]
3.3 Moderate + severe pain: multiparous women: Day 14	1	80	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.4 Moderate + severe pain: spontaneous vaginal birth: Day 14	1	157	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.5 Moderate + severe pain: assisted vaginal birth: Day 14	1	51	Risk Ratio (M-H, Fixed, 95% CI)	2.68 [0.11, 62.81]
4 Pain associated with activities of daily living (walking) within 24 hours of giving birth	1	205	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.90, 1.07]

5 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth	1	203	Risk Ratio (M-H, Fixed, 95% CI)	1.00 [0.87, 1.14]
6 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth	1	202	Risk Ratio (M-H, Fixed, 95% CI)	0.87 [0.60, 1.28]
6.1 Day 10	1	202	Risk Ratio (M-H, Fixed, 95% CI)	0.87 [0.60, 1.28]
7 Additional analgesia for relief of perineal pain: in hospital	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
7.1 Non-prescription analgesia, within 24 hours of giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.86 [0.56, 1.31]
7.2 Prescription analgesia, within 24 hours of giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	1.15 [0.71, 1.86]
8 Additional analgesia for relief of perineal pain: after hospital discharge	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
8.1 Non-prescription analgesia, 10 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	1.54 [0.77, 3.11]
8.2 Prescription analgesia, 10 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	1.13 [0.36, 3.60]
9 Perineal oedema within 24 hours of giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.83, 1.17]
10 Perineal oedema between 24 and 72 hours after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.89 [0.66, 1.19]
11 Perineal oedema between 3 and 14 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.47 [0.04, 5.13]
11.1 Day 14	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.47 [0.04, 5.13]
12 Perineal bruising within 24 hours of giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.94 [0.75, 1.19]
13 Perineal bruising between 24 and 72 hours after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.89 [0.71, 1.10]
14 Perineal bruising between 3 and 14 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.71 [0.16, 3.09]
14.1 Day 14	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.71 [0.16, 3.09]
15 Perineal wound edges gaping	1	207	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.13, 6.51]
15.1 5 days after giving birth	1	207	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.13, 6.51]
16 Perineal wound infection	1	207	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.24, 3.64]
16.1 5 days after giving birth	1	207	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.24, 3.64]
17 Number of women breastfeeding at dischage from postpartum care	1	202	Risk Ratio (M-H, Fixed, 95% CI)	1.07 [0.84, 1.35]
18 Maternal views and experience with treatment	1	202	Risk Ratio (M-H, Fixed, 95% CI)	0.91 [0.79, 1.04]
18.1 Satisfaction with overall perineal care (good + very good + excellent)	1	202	Risk Ratio (M-H, Fixed, 95% CI)	0.91 [0.79, 1.04]
19 Pain that interferes with feeding 3 days after giving birth	1	203	Risk Ratio (M-H, Fixed, 95% CI)	0.81 [0.52, 1.27]

20 Pain that interferes with feeding 10 days after giving birth	1	202	Risk Ratio (M-H, Fixed, 95% CI)	1.06 [0.51, 2.21]

Comparison 2. Cooling treatment (cold gel pad) versus no treatment

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Perineal pain within 24 hours of giving birth	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
1.1 Moderate + severe pain: all women	1	209	Risk Ratio (M-H, Fixed, 95% CI)	1.06 [0.82, 1.37]
1.2 Moderate + severe pain: primiparous women	1	137	Risk Ratio (M-H, Fixed, 95% CI)	1.01 [0.78, 1.31]
1.3 Moderate + severe pain: multiparous women	1	72	Risk Ratio (M-H, Fixed, 95% CI)	1.15 [0.61, 2.16]
1.4 Moderate + severe pain: spontaneous vaginal birth	1	151	Risk Ratio (M-H, Fixed, 95% CI)	1.23 [0.88, 1.72]
1.5 Moderate + severe pain: assisted vaginal birth	1	58	Risk Ratio (M-H, Fixed, 95% CI)	0.74 [0.52, 1.05]
2 Perineal pain 24 to 72 hours after giving birth	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 Moderate + severe pain: all women	1	209	Risk Ratio (M-H, Fixed, 95% CI)	0.73 [0.51, 1.06]
2.2 Moderate + severe pain: primiparous women	1	137	Risk Ratio (M-H, Fixed, 95% CI)	0.70 [0.46, 1.07]
2.3 Moderate + severe pain: multiparous women	1	72	Risk Ratio (M-H, Fixed, 95% CI)	0.79 [0.38, 1.65]
2.4 Moderate + severe pain: spontaneous vaginal birth	1	151	Risk Ratio (M-H, Fixed, 95% CI)	0.77 [0.48, 1.25]
2.5 Moderate + severe pain: assisted vaginal birth	1	58	Risk Ratio (M-H, Fixed, 95% CI)	0.61 [0.36, 1.04]
3 Perineal pain between 3 and 14 days after giving birth	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
3.1 Moderate + severe pain: all women: Day 14	1	209	Risk Ratio (M-H, Fixed, 95% CI)	2.81 [0.12, 68.13]
3.2 Moderate + severe pain: primiparous women: Day 14	1	137	Risk Ratio (M-H, Fixed, 95% CI)	2.64 [0.11, 63.57]
3.3 Moderate + severe pain: multiparous women: Day 14	1	72	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.4 Moderate + severe pain: spontaneous vaginal birth: Day 14	1	151	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
3.5 Moderate + severe pain: assisted vaginal birth: Day 14	1	58	Risk Ratio (M-H, Fixed, 95% CI)	2.14 [0.09, 50.47]
4 Pain associated with activities of daily living (walking) within 24 hours of giving birth	1	207	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.95, 1.10]

5 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth	1	207	Risk Ratio (M-H, Fixed, 95% CI)	1.06 [0.94, 1.21]
6 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.70 [0.47, 1.05]
6.1 Day 10	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.70 [0.47, 1.05]
7 Additional analgesia for relief of perineal pain: in hospital	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
7.1 Non-prescription analgesia, within 24 hours of giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	0.88 [0.58, 1.33]
7.2 Prescription analgesia, within 24 hours of giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	1.34 [0.85, 2.12]
8 Additional analgesia for relief of perineal pain: after hospital discharge	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
8.1 Non-prescription analgesia, 10 days after giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	0.60 [0.24, 1.48]
8.2 Prescription analgesia, 10 days after giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	1.87 [0.66, 5.28]
9 Perineal oedema within 24 hours of giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.87, 1.21]
10 Perineal oedema between 24 and 72 hours after giviing birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	0.76 [0.56, 1.05]
11 Perineal oedema between 3 and 14 days after giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	1.40 [0.24, 8.22]
11.1 Day 14	1	209	Risk Ratio (M-H, Fixed, 95% CI)	1.40 [0.24, 8.22]
12 Perineal bruising within 24 hours of giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	1.01 [0.81, 1.26]
13 Perineal bruising between 24 and 72 hours after giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	1.02 [0.84, 1.25]
14 Perineal bruising between 3 and 14 days after giving birth	1	209	Risk Ratio (M-H, Fixed, 95% CI)	0.47 [0.09, 2.50]
14.1 Day 14	1	209	Risk Ratio (M-H, Fixed, 95% CI)	0.47 [0.09, 2.50]
15 Perineal wound edges gaping	1	208	Risk Ratio (M-H, Fixed, 95% CI)	4.17 [0.92, 18.82]
15.1 5 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	4.17 [0.92, 18.82]
16 Perineal wound infection	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.10 [0.01, 1.89]
16.1 5 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.10 [0.01, 1.89]
17 Number of women breastfeeding at discharge from postpartum care	1	206	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.72, 1.19]
18 Maternal views and experience with treatment	1	206	Risk Ratio (M-H, Fixed, 95% CI)	1.11 [1.01, 1.23]
18.1 Satisfaction with overall perineal care (good + very good + excellent)	1	206	Risk Ratio (M-H, Fixed, 95% CI)	1.11 [1.01, 1.23]
19 Pain that interferes with feeding 3 days after giving birth	1	207	Risk Ratio (M-H, Fixed, 95% CI)	0.63 [0.39, 1.03]

20 Pain that interferes with feeding 10 days after giving birth	1	206	Risk Ratio (M-H, Fixed, 95% CI)	0.94 [0.44, 2.00]

Comparison 3. Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Perineal pain within 4 to 6 hours of giving birth	1	49	Risk Ratio (M-H, Fixed, 95% CI)	0.57 [0.26, 1.24]
1.1 Moderate + severe pain	1	49	Risk Ratio (M-H, Fixed, 95% CI)	0.57 [0.26, 1.24]
2 Perineal pain within 24 hours of giving birth	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
2.1 Moderate + severe pain: all women	2	264	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.78, 1.22]
2.2 Moderate + severe pain: primiparous women	1	137	Risk Ratio (M-H, Fixed, 95% CI)	0.89 [0.68, 1.18]
2.3 Moderate + severe pain: multiparous women	1	78	Risk Ratio (M-H, Fixed, 95% CI)	1.19 [0.69, 2.05]
2.4 Moderate + severe pain: spontaneous vaginal birth	1	154	Risk Ratio (M-H, Fixed, 95% CI)	0.93 [0.68, 1.26]
2.5 Moderate + severe pain: assisted vaginal birth	1	61	Risk Ratio (M-H, Fixed, 95% CI)	1.01 [0.66, 1.53]
3 Perineal pain between 24 and 72 hours after giving birth	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
3.1 Moderate + severe pain: all women	2	263	Risk Ratio (M-H, Fixed, 95% CI)	0.94 [0.64, 1.37]
3.2 Moderate + severe pain: primiparous women	1	137	Risk Ratio (M-H, Fixed, 95% CI)	0.90 [0.55, 1.49]
3.3 Moderate + severe pain: multiparous women	1	78	Risk Ratio (M-H, Fixed, 95% CI)	0.72 [0.31, 1.68]
3.4 Moderate + severe pain: spontaneous vaginal birth	1	154	Risk Ratio (M-H, Fixed, 95% CI)	0.79 [0.45, 1.38]
3.5 Moderate + severe pain: assisted vaginal birth	1	61	Risk Ratio (M-H, Fixed, 95% CI)	0.97 [0.50, 1.86]
4 Perineal pain between 3 and 14 days after giving birth	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Moderate + severe pain: all women	2	261	Risk Ratio (M-H, Fixed, 95% CI)	1.83 [0.83, 4.06]
4.2 Moderate + severe pain: primiparous women: Day 14	1	137	Risk Ratio (M-H, Fixed, 95% CI)	1.14 [0.07, 17.87]
4.3 Moderate + severe pain: multiparous women: Day 14	1	78	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.4 Moderate + severe pain: spontaneous vaginal birth: Day 14	1	154	Risk Ratio (M-H, Fixed, 95% CI)	Not estimable
4.5 Moderate + severe pain: assisted vaginal birth: Day 14	1	61	Risk Ratio (M-H, Fixed, 95% CI)	1.26 [0.08, 19.22]

5 Pain associated with activities of daily living (walking) within 24 hours of giving birth	1	212	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.89, 1.04]
6 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth	1	210	Risk Ratio (M-H, Fixed, 95% CI)	0.94 [0.83, 1.06]
7 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	1.22 [0.80, 1.87]
7.1 Day 10	1	208	Risk Ratio (M-H, Fixed, 95% CI)	1.22 [0.80, 1.87]
8 Additional analgesia for relief of perineal pain: in hospital	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
8.1 Non-prescription analgesia, within 24 hours of giving birth	1	215	Risk Ratio (M-H, Fixed, 95% CI)	0.98 [0.63, 1.51]
8.2 Prescription analgesia, within 24 hours of giving birth	1	215	Risk Ratio (M-H, Fixed, 95% CI)	0.86 [0.56, 1.31]
9 Additional analgesia for relief of perineal pain: after hospital discharge	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
9.1 Non-prescription analgesia, 10 days after giving birth	1	215	Risk Ratio (M-H, Fixed, 95% CI)	2.60 [1.13, 5.96]
9.2 Prescription analgesia, 10 days after giving birth	1	215	Risk Ratio (M-H, Fixed, 95% CI)	0.67 [0.25, 1.83]
10 Perineal oedema within 4 to 6 hours of giving birth	1	49	Risk Ratio (M-H, Fixed, 95% CI)	1.39 [0.93, 2.09]
11 Perineal oedema within 24 hours of giving birth	2	264	Risk Ratio (M-H, Fixed, 95% CI)	0.97 [0.84, 1.13]
12 Perineal oedema between 24 and 72 hours after giving birth	2	264	Risk Ratio (M-H, Random, 95% CI)	1.58 [0.77, 3.24]
13 Perineal oedema 3 to 14 days after giving birth	1	215	Risk Ratio (M-H, Fixed, 95% CI)	0.34 [0.04, 3.18]
13.1 Day 14	1	215	Risk Ratio (M-H, Fixed, 95% CI)	0.34 [0.04, 3.18]
14 Perineal bruising within 4 to 6 hours of giving birth	1	49	Risk Ratio (M-H, Fixed, 95% CI)	1.23 [0.51, 2.97]
15 Perineal bruising within 24 hours of giving birth	2	264	Risk Ratio (M-H, Fixed, 95% CI)	0.95 [0.79, 1.14]
16 Perineal bruising between 24 and 72 hours after giving birth	2	264	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.72, 1.42]
17 Perineal bruising 3 to 14 days after giving birth	1	215	Risk Ratio (M-H, Fixed, 95% CI)	1.51 [0.26, 8.88]
17.1 Day 14	1	215	Risk Ratio (M-H, Fixed, 95% CI)	1.51 [0.26, 8.88]
18 Perineal wound edges gaping	1	215	Risk Ratio (M-H, Fixed, 95% CI)	0.22 [0.05, 1.01]
18.1 5 days after giving birth	1	215	Risk Ratio (M-H, Fixed, 95% CI)	0.22 [0.05, 1.01]
19 Perineal wound infection	1	215	Risk Ratio (M-H, Fixed, 95% CI)	9.08 [0.50, 166.67]
19.1 5 days after giving birth	1	215	Risk Ratio (M-H, Fixed, 95% CI)	9.08 [0.50, 166.67]
20 Number of women breastfeeding at discharge from postpartum care	1	208	Risk Ratio (M-H, Fixed, 95% CI)	1.15 [0.90, 1.47]

21 Maternal views and experience with treatment	2		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
21.1 Satisfaction with overall perineal care (good + very good + excellent)	1	208	Risk Ratio (M-H, Fixed, 95% CI)	0.82 [0.73, 0.92]
21.2 Opinions on treatment effects (good + very good + excellent)	1	49	Risk Ratio (M-H, Fixed, 95% CI)	0.33 [0.17, 0.68]
22 Pain that interferes with feeding 3 days after giving birth	1	210	Risk Ratio (M-H, Fixed, 95% CI)	1.29 [0.77, 2.14]
23 Pain that interferes with feeding 10 days after giving birth	1	208	Risk Ratio (M-H, Fixed, 95% CI)	1.13 [0.54, 2.35]

Comparison 4. Cooling treatment versus pulsed electromagnetic energy

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Perineal pain 24 to 72 hours after giving birth	1	100	Risk Ratio (M-H, Fixed, 95% CI)	5.6 [2.35, 13.33]
1.1 Moderate + severe + unbearable	1	100	Risk Ratio (M-H, Fixed, 95% CI)	5.6 [2.35, 13.33]
2 Additional analgesia for relief of perineal pain: in hospital	1	100	Risk Ratio (M-H, Fixed, 95% CI)	4.0 [1.44, 11.13]
2.1 Diclofenac	1	100	Risk Ratio (M-H, Fixed, 95% CI)	4.0 [1.44, 11.13]

Comparison 5. Cooling treatment versus hamamelis water

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Perineal pain within 24 hours of giving birth	1	146	Risk Ratio (M-H, Fixed, 95% CI)	1.26 [0.81, 1.96]
1.1 None or mild pain relief	1	146	Risk Ratio (M-H, Fixed, 95% CI)	1.26 [0.81, 1.96]
2 Perineal pain between 24 and 72 hours after giving birth	1	144	Risk Ratio (M-H, Fixed, 95% CI)	0.68 [0.37, 1.24]
2.1 None or mild pain relief	1	144	Risk Ratio (M-H, Fixed, 95% CI)	0.68 [0.37, 1.24]
3 Perineal pain between 3 and 14 days after giving birth	1	143	Risk Ratio (M-H, Fixed, 95% CI)	0.50 [0.22, 1.13]
3.1 None or mild pain relief: Day 5	1	143	Risk Ratio (M-H, Fixed, 95% CI)	0.50 [0.22, 1.13]
4 Additional analgesia for relief of perineal pain: in hospital	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
4.1 Salt baths (2 or less per day)	1	144	Risk Ratio (M-H, Fixed, 95% CI)	1.08 [0.94, 1.23]

4.2 Paracetamol (less than 6 per day over first 72 hours after giving birth)	1	144	Risk Ratio (M-H, Fixed, 95% CI)	1.00 [0.85, 1.18]
5 Perineal oedema within 24 hours of giving birth	1	152	Risk Ratio (M-H, Fixed, 95% CI)	1.81 [0.91, 3.60]
6 Perineal oedema between 24 and 72 hours after giving birth	1	152	Risk Ratio (M-H, Fixed, 95% CI)	2.01 [0.84, 4.82]
7 Perineal oedema between 3 and 14 days after giving birth	1	143	Risk Ratio (M-H, Fixed, 95% CI)	1.10 [0.33, 3.64]
7.1 Day 5	1	143	Risk Ratio (M-H, Fixed, 95% CI)	1.10 [0.33, 3.64]
8 Perineal bruising within 24 hours of giving birth	1	152	Risk Ratio (M-H, Fixed, 95% CI)	1.20 [0.94, 1.53]
9 Perineal bruising between 24 and 72 hours after giving birth	1	152	Risk Ratio (M-H, Fixed, 95% CI)	0.88 [0.67, 1.17]
10 Perineal bruising between 3 and 14 days after giving birth	1	143	Risk Ratio (M-H, Fixed, 95% CI)	1.21 [0.74, 1.98]
10.1 Day 5	1	143	Risk Ratio (M-H, Fixed, 95% CI)	1.21 [0.74, 1.98]

Comparison 6. Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Perineal pain wthin 4 to 6 hours of giving birth	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.85 [0.36, 2.02]
1.1 Moderate + severe pain	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.85 [0.36, 2.02]
2 Perineal pain within 24 hours of giving birth	2	189	Risk Ratio (M-H, Fixed, 95% CI)	0.95 [0.70, 1.30]
2.1 None or mild pain relief	1	139	Risk Ratio (M-H, Fixed, 95% CI)	0.94 [0.63, 1.42]
2.2 Moderate + severe pain	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.97 [0.62, 1.54]
3 Perineal pain between 24 and 72 hours after giving birth	2	187	Risk Ratio (M-H, Fixed, 95% CI)	0.77 [0.49, 1.21]
3.1 None or mild pain relief	1	137	Risk Ratio (M-H, Fixed, 95% CI)	0.62 [0.34, 1.12]
3.2 Moderate + severe pain	1	50	Risk Ratio (M-H, Fixed, 95% CI)	1.15 [0.57, 2.32]
4 Perineal pain between 3 and 14 days after giving birth	2	182	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.50, 1.81]
4.1 None or mild pain relief	1	135	Risk Ratio (M-H, Random, 95% CI)	0.65 [0.27, 1.57]
4.2 Moderate + severe pain	1	47	Risk Ratio (M-H, Random, 95% CI)	1.24 [0.64, 2.40]
5 Additional analgesia for relief of perineal pain: in hospital	1		Risk Ratio (M-H, Fixed, 95% CI)	Subtotals only
5.1 Salt baths (2 or less per day)	1	137	Risk Ratio (M-H, Fixed, 95% CI)	0.99 [0.88, 1.12]
5.2 Paracetamol (less than 6 per day over first 72 hours after giving birth)	1	137	Risk Ratio (M-H, Fixed, 95% CI)	0.96 [0.82, 1.12]
6 Perineal oedema within 4 to 6 hours of giving birth	1	50	Risk Ratio (M-H, Fixed, 95% CI)	1.03 [0.75, 1.41]
7 Perineal oedema within 24 hours of giving birth	2	196	Risk Ratio (M-H, Fixed, 95% CI)	1.18 [0.84, 1.68]

8 Perineal oedema between 24 and 72 hours of giving birth	2	196	Risk Ratio (M-H, Random, 95% CI)	1.37 [0.64, 2.91]
9 Perineal oedema between 3 and 14 days after giving birth	1	143	Risk Ratio (M-H, Fixed, 95% CI)	0.79 [0.26, 2.37]
9.1 Day 5	1	143	Risk Ratio (M-H, Fixed, 95% CI)	0.79 [0.26, 2.37]
10 Perineal bruising within 4 to 6 hours of giving birth	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.74 [0.35, 1.57]
11 Perineal bruising within 24 hours of giving birth	2	196	Risk Ratio (M-H, Random, 95% CI)	1.16 [0.55, 2.43]
12 Perineal bruising between 24 and 72 hours of giving birth	2	196	Risk Ratio (M-H, Fixed, 95% CI)	1.06 [0.84, 1.32]
13 Perineal bruising between 3 and 14 days after giving birth	1	143	Risk Ratio (M-H, Fixed, 95% CI)	0.91 [0.58, 1.41]
13.1 Day 5	1	143	Risk Ratio (M-H, Fixed, 95% CI)	0.91 [0.58, 1.41]
14 Maternal views and experience with treatment	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.85 [0.36, 2.02]
14.1 Opinions on treatment effects (good + very good + excellent)	1	50	Risk Ratio (M-H, Fixed, 95% CI)	0.85 [0.36, 2.02]

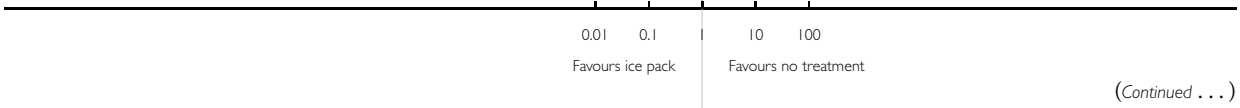
Analysis 1.1. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 1 Perineal pain within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 1 Perineal pain within 24 hours of giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Moderate + severe pain: all women					
The APT Study	55/107	52/101		100.0 %	1.00 [0.77, 1.30]
Subtotal (95% CI)	**107**	**101**		**100.0 %**	**1.00 [0.77, 1.30]**
Total events: 55 (Ice pack), 52 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.01 (P = 0.99)					
2 Moderate + severe pain: primiparous women					
The APT Study	36/64	40/64		100.0 %	0.90 [0.68, 1.20]
Subtotal (95% CI)	**64**	**64**		**100.0 %**	**0.90 [0.68, 1.20]**
Total events: 36 (Ice pack), 40 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.72 (P = 0.47)					
3 Moderate + severe pain: multiparous women					



(*Continued* . . .)

(. . . *Continued*)

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	19/43	12/37		100.0 %	1.36 [0.77, 2.42]
Subtotal (95% CI)	**43**	**37**		**100.0 %**	**1.36 [0.77, 2.42]**
Total events: 19 (Ice pack), 12 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.06 (P = 0.29)					
4 Moderate + severe pain: spontaneous vaginal birth					
The APT Study	39/80	33/77		100.0 %	1.14 [0.81, 1.60]
Subtotal (95% CI)	**80**	**77**		**100.0 %**	**1.14 [0.81, 1.60]**
Total events: 39 (Ice pack), 33 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.74 (P = 0.46)					
5 Moderate + severe pain: assisted vaginal birth					
The APT Study	16/27	19/24		100.0 %	0.75 [0.51, 1.09]
Subtotal (95% CI)	**27**	**24**		**100.0 %**	**0.75 [0.51, 1.09]**
Total events: 16 (Ice pack), 19 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.52 (P = 0.13)					

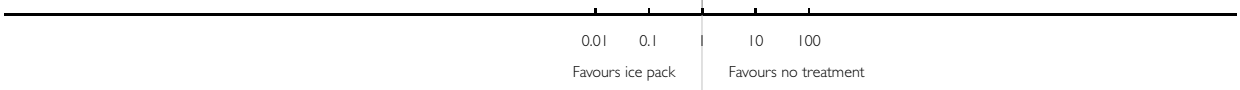
Analysis 1.2. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 2 Perineal pain 24 to 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 2 Perineal pain 24 to 72 hours after giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Moderate + severe pain: all women					
The APT Study	27/107	42/101		100.0 %	0.61 [0.41, 0.91]
Subtotal (95% CI)	**107**	**101**		**100.0 %**	**0.61 [0.41, 0.91]**
Total events: 27 (Ice pack), 42 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 2.45 (P = 0.014)					
2 Moderate + severe pain: primiparous women					
The APT Study	19/64	30/64		100.0 %	0.63 [0.40, 1.00]
Subtotal (95% CI)	**64**	**64**		**100.0 %**	**0.63 [0.40, 1.00]**
Total events: 19 (Ice pack), 30 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.95 (P = 0.051)					
3 Moderate + severe pain: multiparous women					
The APT Study	8/43	12/37		100.0 %	0.57 [0.26, 1.25]
Subtotal (95% CI)	**43**	**37**		**100.0 %**	**0.57 [0.26, 1.25]**
Total events: 8 (Ice pack), 12 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.40 (P = 0.16)					
4 Moderate + severe pain: spontaneous vaginal birth					
The APT Study	17/80	27/77		100.0 %	0.61 [0.36, 1.02]
Subtotal (95% CI)	**80**	**77**		**100.0 %**	**0.61 [0.36, 1.02]**
Total events: 17 (Ice pack), 27 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.89 (P = 0.059)					
5 Moderate + severe pain: assisted vaginal birth					
The APT Study	10/27	15/24		100.0 %	0.59 [0.33, 1.06]
Subtotal (95% CI)	**27**	**24**		**100.0 %**	**0.59 [0.33, 1.06]**
Total events: 10 (Ice pack), 15 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.76 (P = 0.078)					

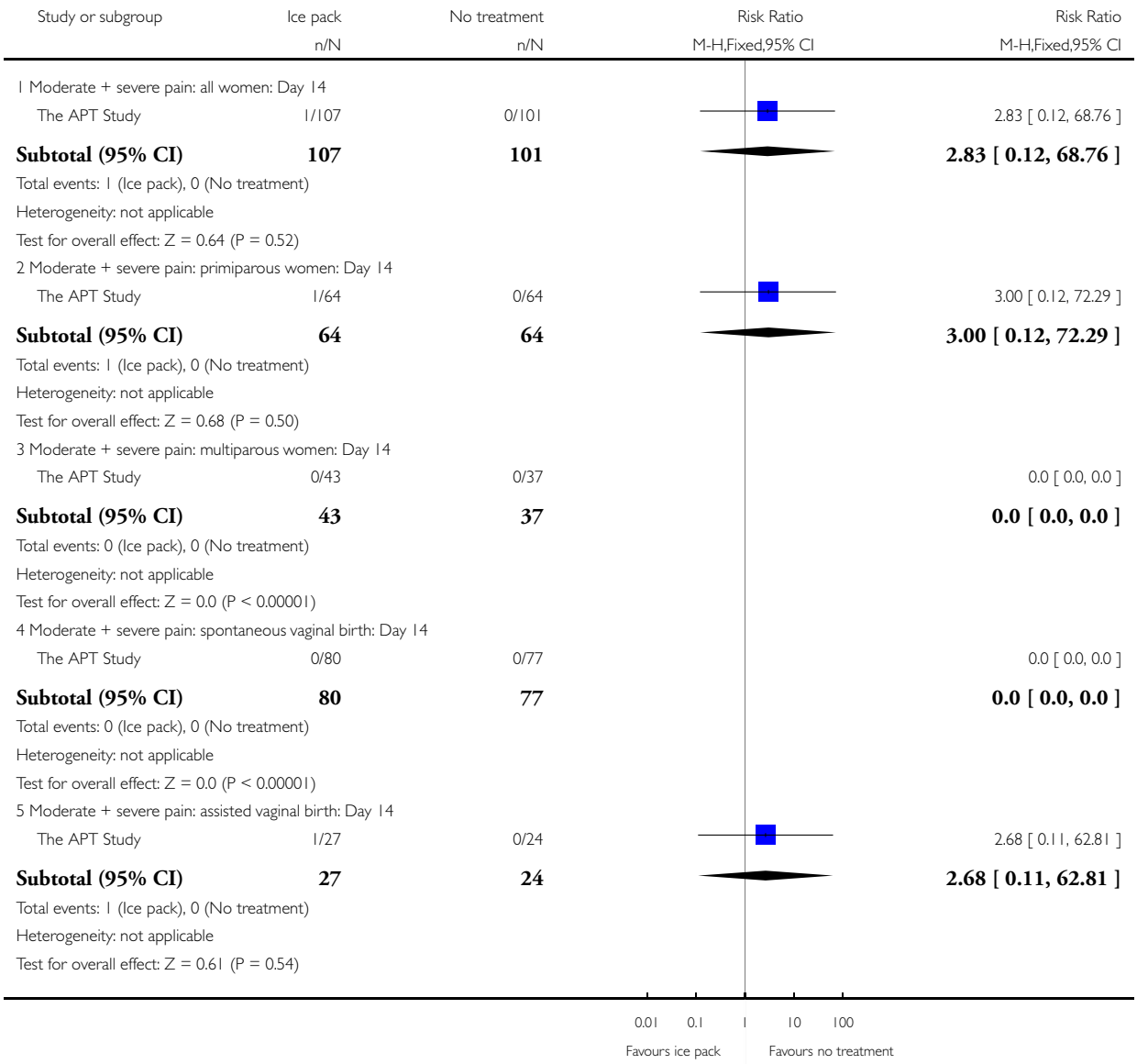


Analysis 1.3. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 3 Perineal pain between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 3 Perineal pain between 3 and 14 days after giving birth



Analysis 1.4. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 4 Pain associated with activities of daily living (walking) within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 4 Pain associated with activities of daily living (walking) within 24 hours of giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	95/105	92/100		100.0 %	0.98 [0.90, 1.07]
Total (95% CI)	**105**	**100**		**100.0 %**	**0.98 [0.90, 1.07]**
Total events: 95 (Ice pack), 92 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.39 (P = 0.70)					

Analysis 1.5. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 5 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 5 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth

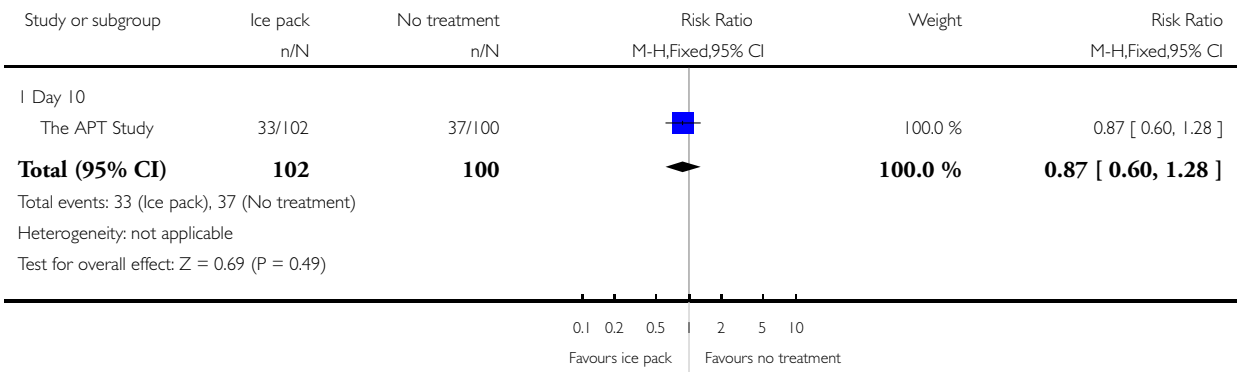
Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	82/103	80/100		100.0 %	1.00 [0.87, 1.14]
Total (95% CI)	**103**	**100**		**100.0 %**	**1.00 [0.87, 1.14]**
Total events: 82 (Ice pack), 80 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.07 (P = 0.95)					

Analysis 1.6. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 6 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 6 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth

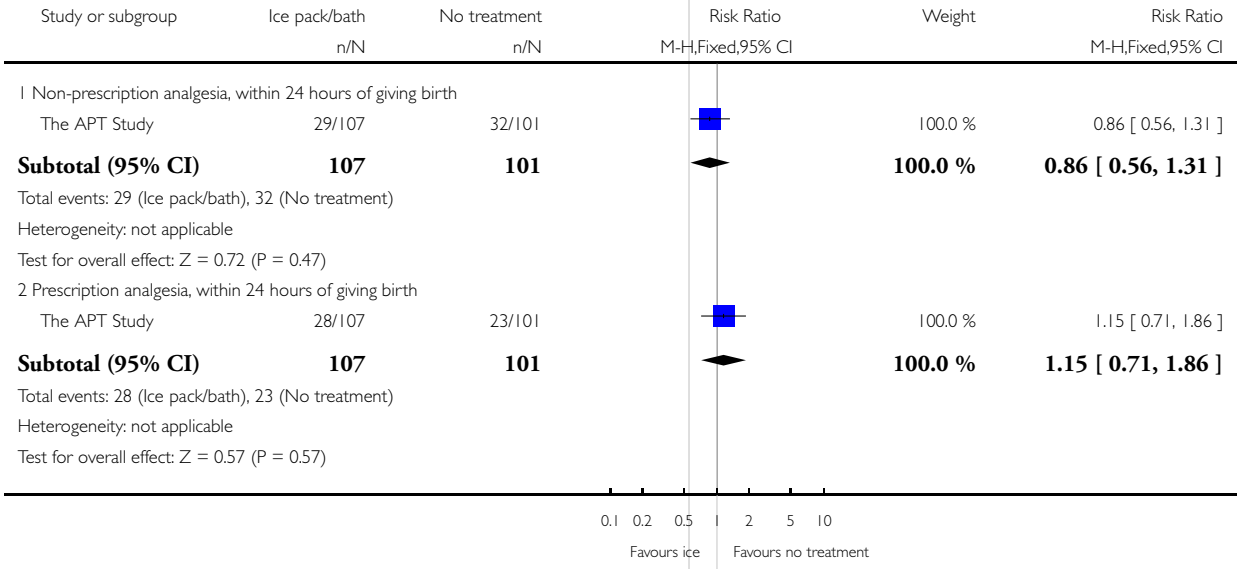


Analysis 1.7. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 7 Additional analgesia for relief of perineal pain: in hospital.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 7 Additional analgesia for relief of perineal pain: in hospital

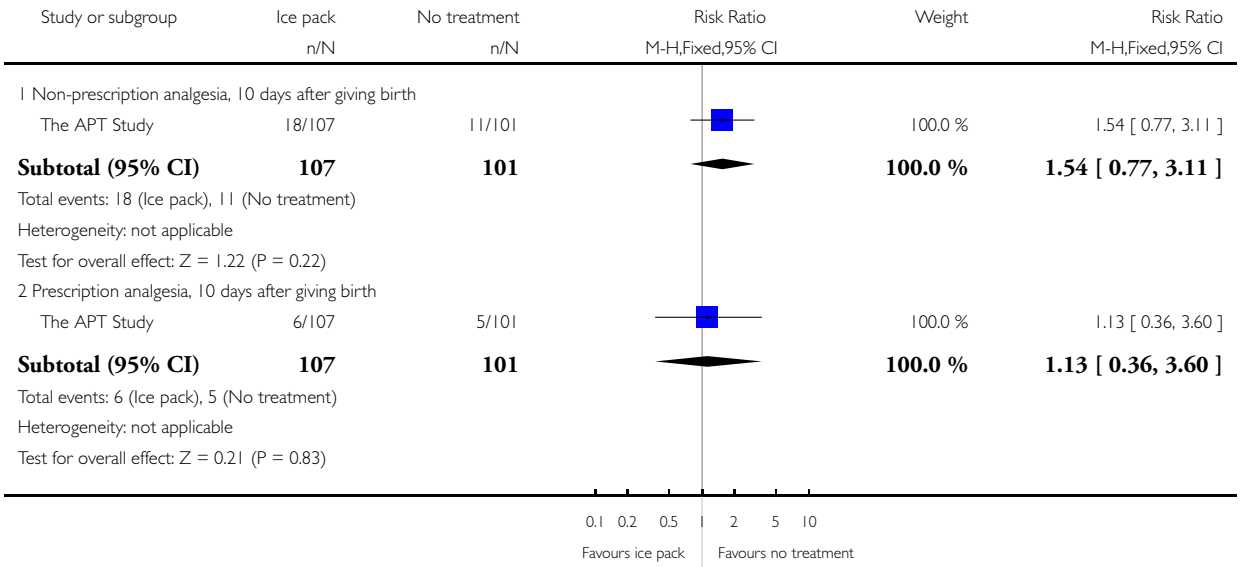


Analysis 1.8. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 8 Additional analgesia for relief of perineal pain: after hospital discharge.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 8 Additional analgesia for relief of perineal pain: after hospital discharge



Analysis 1.9. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 9 Perineal oedema within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 9 Perineal oedema within 24 hours of giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	76/107	73/101		100.0 %	0.98 [0.83, 1.17]
Total (95% CI)	**107**	**101**		**100.0 %**	**0.98 [0.83, 1.17]**
Total events: 76 (Ice pack), 73 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.20 (P = 0.84)					

Analysis 1.10. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 10 Perineal oedema between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 10 Perineal oedema between 24 and 72 hours after giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	46/107	49/101		100.0 %	0.89 [0.66, 1.19]
Total (95% CI)	**107**	**101**		**100.0 %**	**0.89 [0.66, 1.19]**
Total events: 46 (Ice pack), 49 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.80 (P = 0.42)					

Analysis 1.11. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 11 Perineal oedema between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 11 Perineal oedema between 3 and 14 days after giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Day 14					
The APT Study	1/107	2/101		100.0 %	0.47 [0.04, 5.13]
Total (95% CI)	**107**	**101**		**100.0 %**	**0.47 [0.04, 5.13]**
Total events: 1 (Ice pack), 2 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.62 (P = 0.54)					

Analysis 1.12. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 12 Perineal bruising within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 12 Perineal bruising within 24 hours of giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	61/107	61/101		100.0 %	0.94 [0.75, 1.19]
Total (95% CI)	**107**	**101**		**100.0 %**	**0.94 [0.75, 1.19]**
Total events: 61 (Ice pack), 61 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.50 (P = 0.62)					

Analysis 1.13. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 13 Perineal bruising between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 13 Perineal bruising between 24 and 72 hours after giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	61/107	65/101		100.0 %	0.89 [0.71, 1.10]
Total (95% CI)	**107**	**101**		**100.0 %**	**0.89 [0.71, 1.10]**
Total events: 61 (Ice pack), 65 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.08 (P = 0.28)					

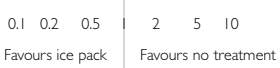
Analysis 1.14. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 14 Perineal bruising between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 14 Perineal bruising between 3 and 14 days after giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Day 14					
The APT Study	3/107	4/101		100.0 %	0.71 [0.16, 3.09]
Total (95% CI)	**107**	**101**		**100.0 %**	**0.71 [0.16, 3.09]**
Total events: 3 (Ice pack), 4 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.46 (P = 0.65)					

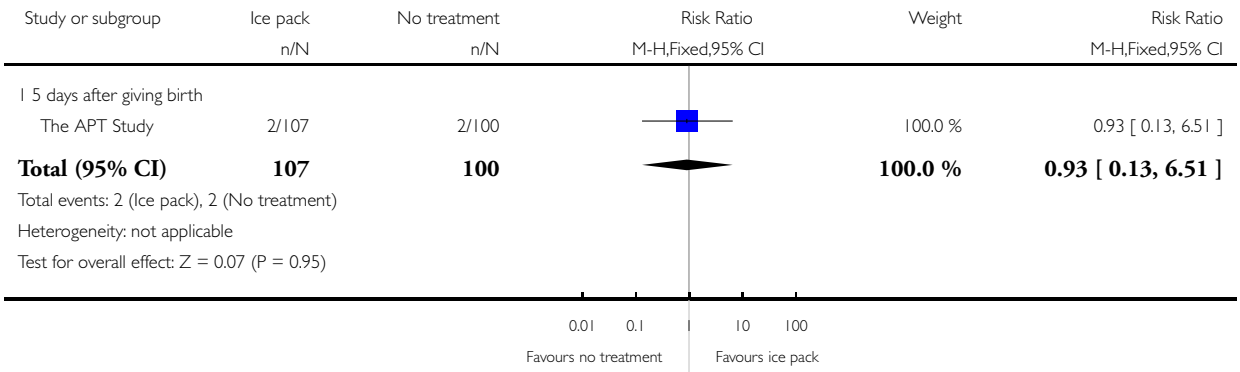


Analysis 1.15. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 15 Perineal wound edges gaping.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 15 Perineal wound edges gaping

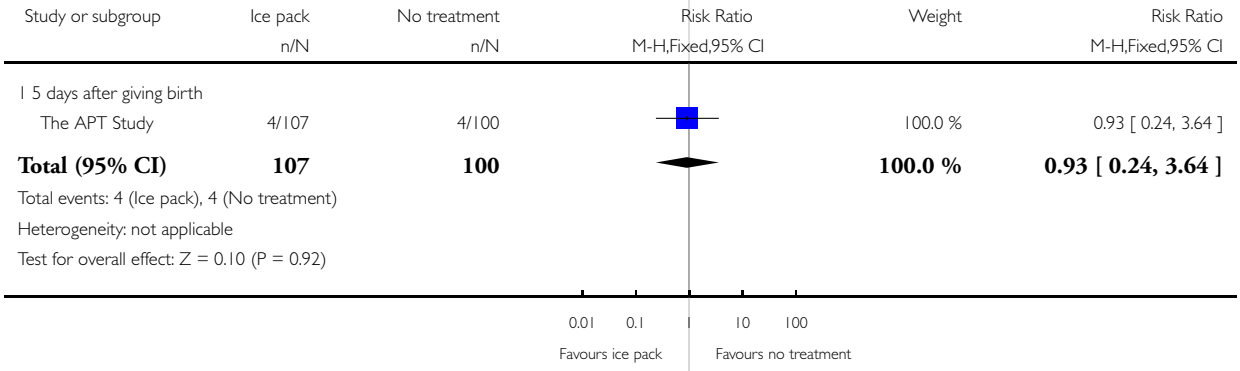


Analysis 1.16. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 16 Perineal wound infection.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 16 Perineal wound infection



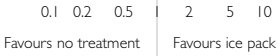
Analysis 1.17. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 17 Number of women breastfeeding at dischage from postpartum care.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 17 Number of women breastfeeding at dischage from postpartum care

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	61/102	56/100		100.0 %	1.07 [0.84, 1.35]
Total (95% CI)	**102**	**100**		**100.0 %**	**1.07 [0.84, 1.35]**
Total events: 61 (Ice pack), 56 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.55 (P = 0.58)					



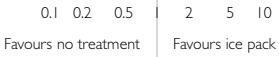
Analysis 1.18. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 18 Maternal views and experience with treatment.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 18 Maternal views and experience with treatment

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Satisfaction with overall perineal care (good + very good + excellent)					
The APT Study	78/102	84/100		100.0 %	0.91 [0.79, 1.04]
Total (95% CI)	**102**	**100**		**100.0 %**	**0.91 [0.79, 1.04]**
Total events: 78 (Ice pack), 84 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.34 (P = 0.18)					



Analysis 1.19. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 19 Pain that interferes with feeding 3 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 19 Pain that interferes with feeding 3 days after giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	26/103	31/100		100.0 %	0.81 [0.52, 1.27]
Total (95% CI)	**103**	**100**		**100.0 %**	**0.81 [0.52, 1.27]**

Total events: 26 (Ice pack), 31 (No treatment)

Heterogeneity: not applicable

Test for overall effect: Z = 0.91 (P = 0.36)

Analysis 1.20. Comparison 1 Cooling treatment (ice pack) versus no treatment, Outcome 20 Pain that interferes with feeding 10 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 1 Cooling treatment (ice pack) versus no treatment

Outcome: 20 Pain that interferes with feeding 10 days after giving birth

Study or subgroup	Ice pack n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	13/102	12/100		100.0 %	1.06 [0.51, 2.21]
Total (95% CI)	**102**	**100**		**100.0 %**	**1.06 [0.51, 2.21]**

Total events: 13 (Ice pack), 12 (No treatment)

Heterogeneity: not applicable

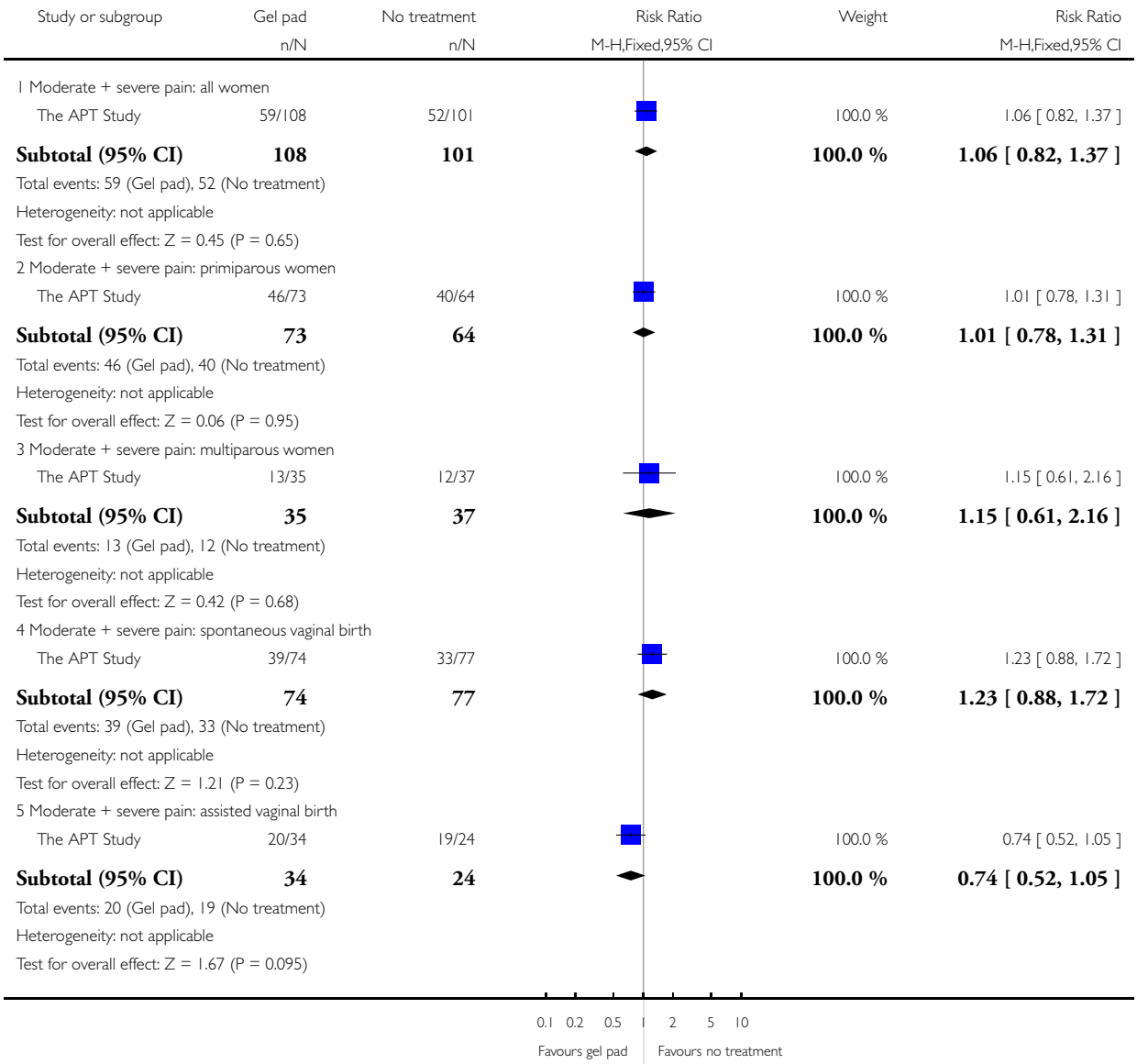
Test for overall effect: Z = 0.16 (P = 0.87)

Analysis 2.1. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 1 Perineal pain within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 1 Perineal pain within 24 hours of giving birth

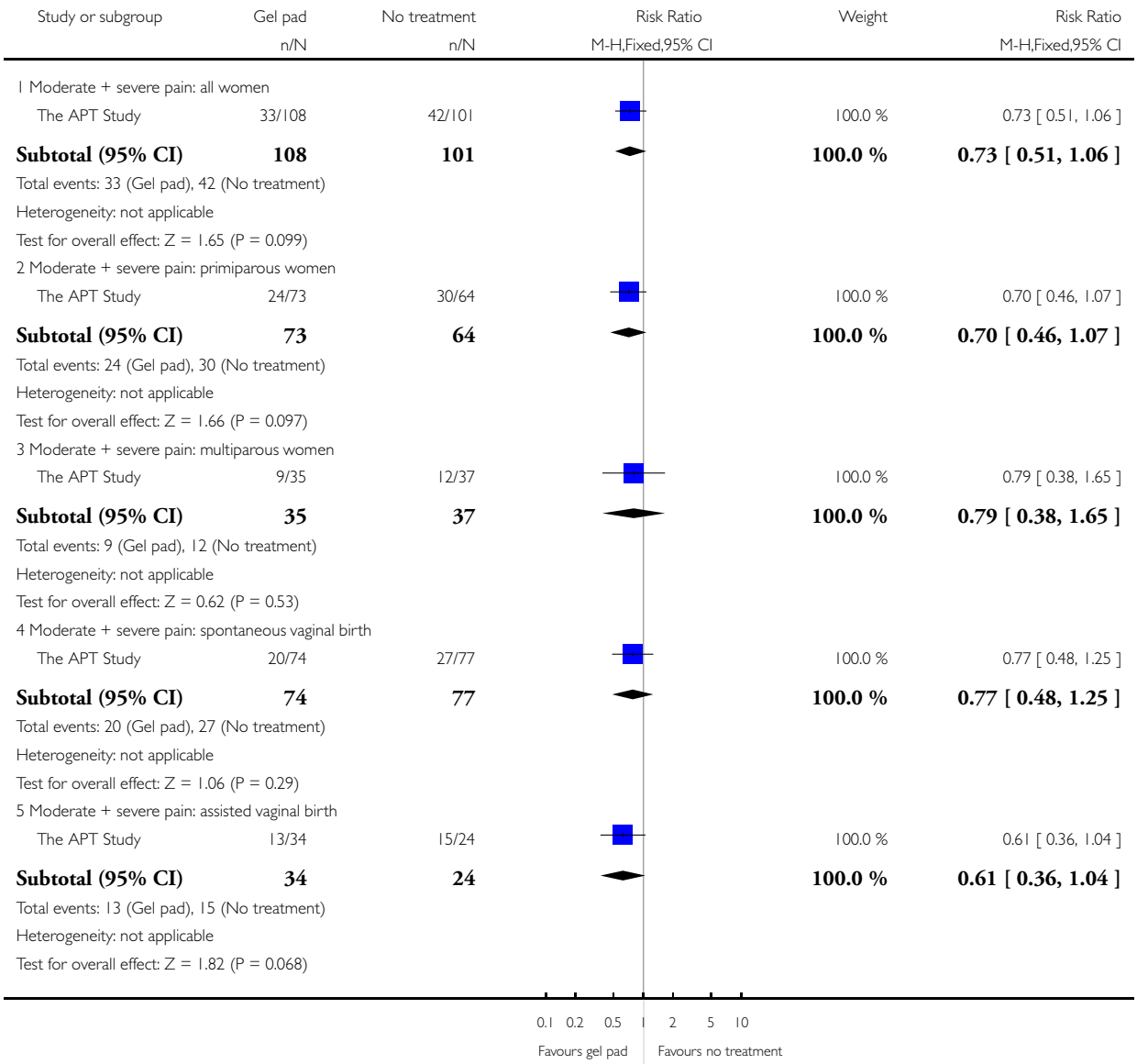


Analysis 2.2. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 2 Perineal pain 24 to 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 2 Perineal pain 24 to 72 hours after giving birth

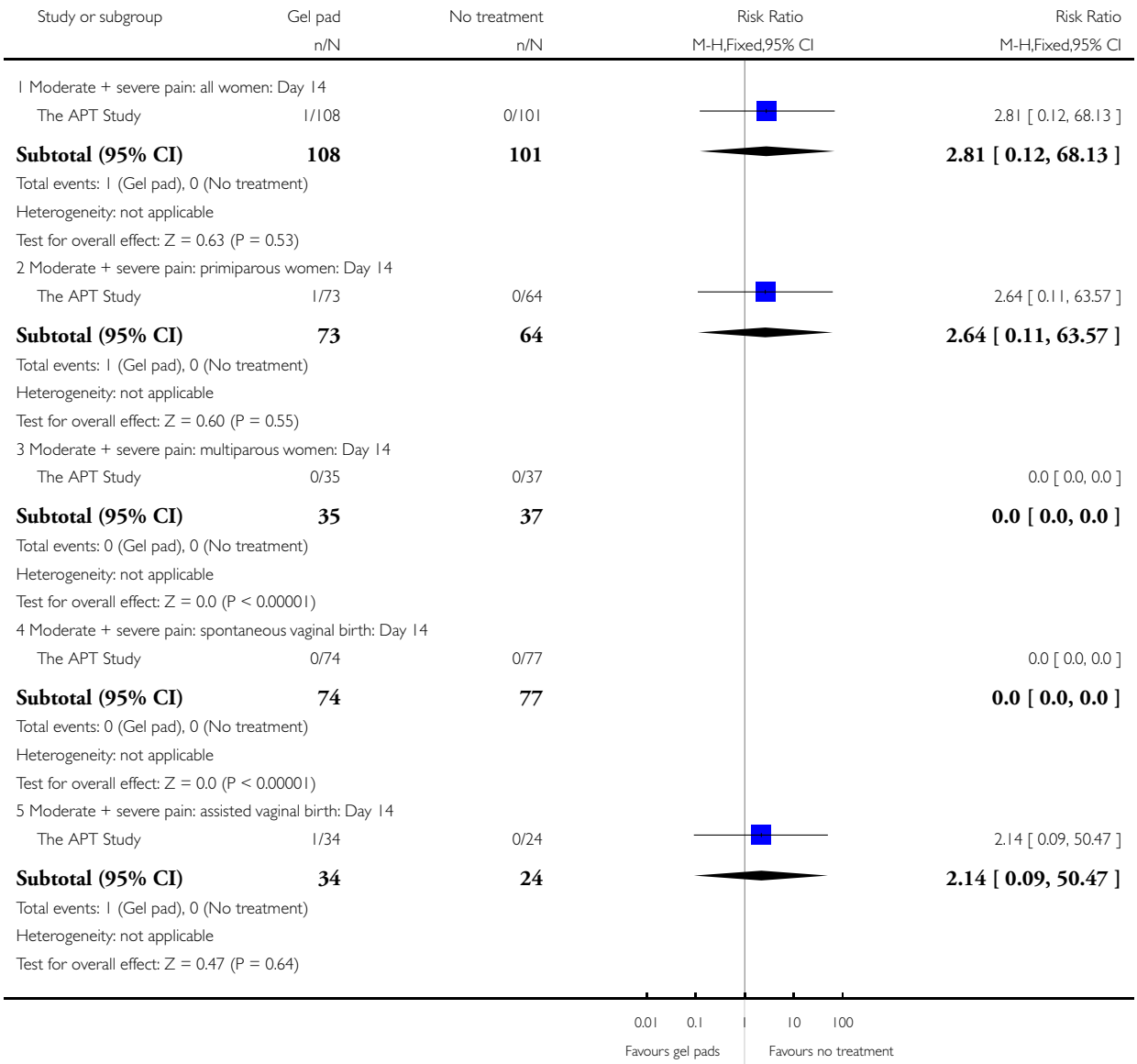


Analysis 2.3. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 3 Perineal pain between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 3 Perineal pain between 3 and 14 days after giving birth



Analysis 2.4. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 4 Pain associated with activities of daily living (walking) within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 4 Pain associated with activities of daily living (walking) within 24 hours of giving birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	101/107	92/100		100.0 %	1.03 [0.95, 1.10]
Total (95% CI)	**107**	**100**		**100.0 %**	**1.03 [0.95, 1.10]**
Total events: 101 (Gel pad), 92 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.68 (P = 0.50)					

Analysis 2.5. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 5 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 5 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth

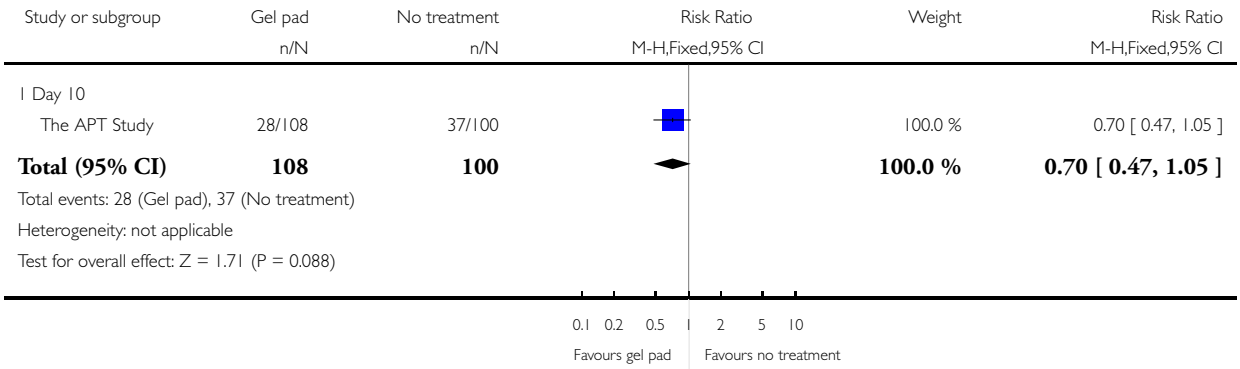
Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	91/107	80/100		100.0 %	1.06 [0.94, 1.21]
Total (95% CI)	**107**	**100**		**100.0 %**	**1.06 [0.94, 1.21]**
Total events: 91 (Gel pad), 80 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.95 (P = 0.34)					

Analysis 2.6. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 6 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 6 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth

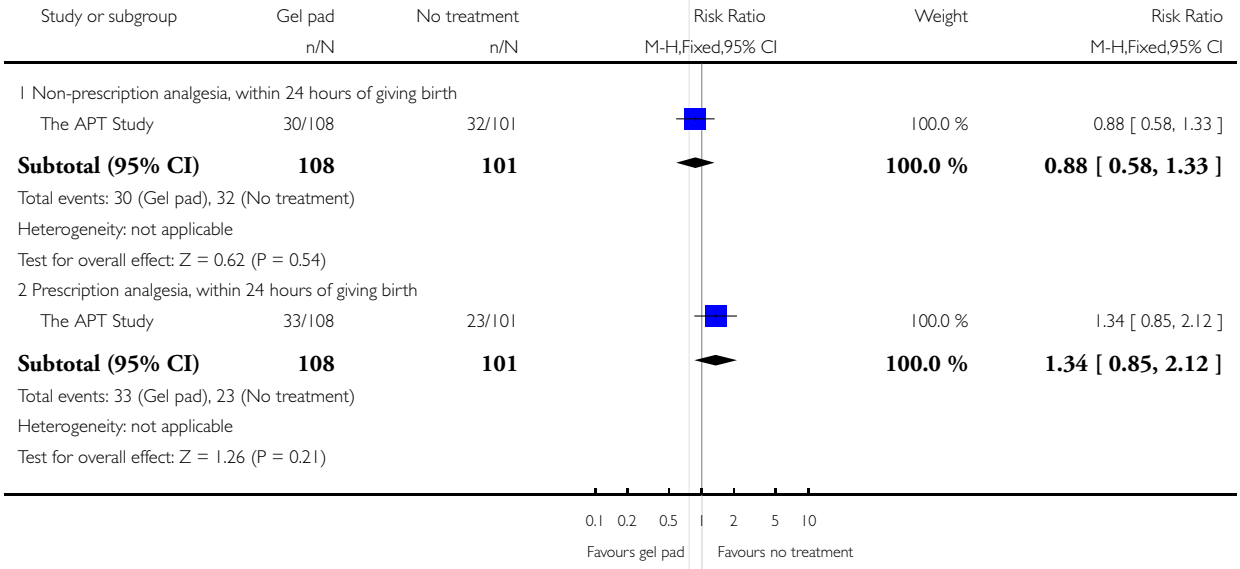


Analysis 2.7. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 7 Additional analgesia for relief of perineal pain: in hospital.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 7 Additional analgesia for relief of perineal pain: in hospital

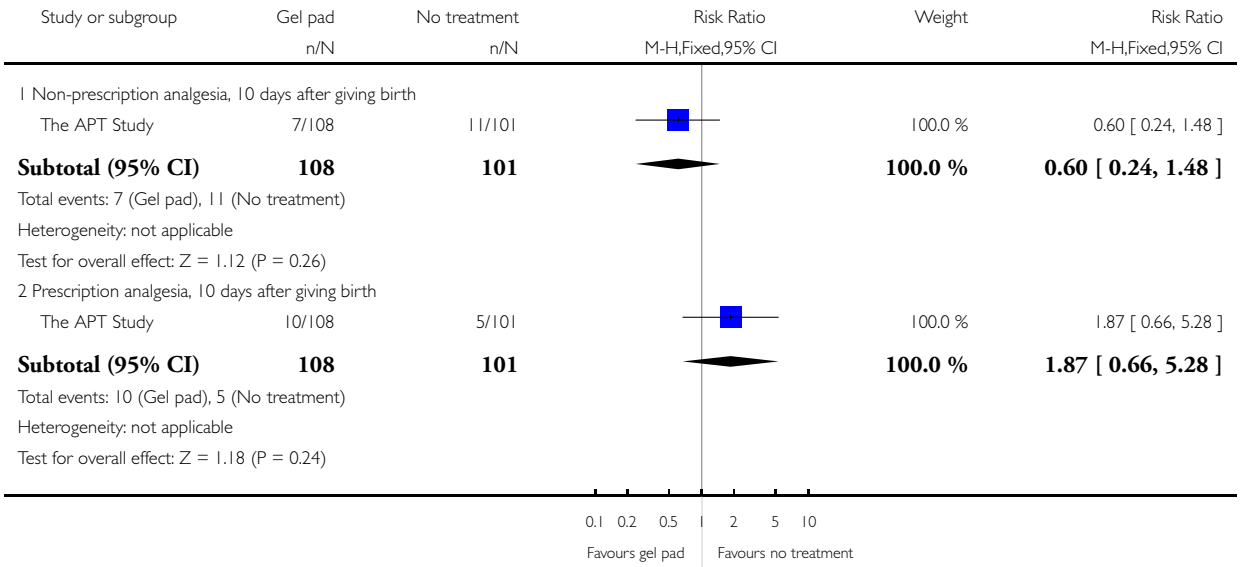


Analysis 2.8. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 8 Additional analgesia for relief of perineal pain: after hospital discharge.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 8 Additional analgesia for relief of perineal pain: after hospital discharge



Analysis 2.9. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 9 Perineal oedema within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 9 Perineal oedema within 24 hours of giving birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	80/108	73/101		100.0 %	1.02 [0.87, 1.21]
Total (95% CI)	**108**	**101**		**100.0 %**	**1.02 [0.87, 1.21]**
Total events: 80 (Gel pad), 73 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.29 (P = 0.77)					

Analysis 2.10. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 10 Perineal oedema between 24 and 72 hours after giviing birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 10 Perineal oedema between 24 and 72 hours after giviing birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	40/108	49/101		100.0 %	0.76 [0.56, 1.05]
Total (95% CI)	**108**	**101**		**100.0 %**	**0.76 [0.56, 1.05]**
Total events: 40 (Gel pad), 49 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.67 (P = 0.096)					

Analysis 2.11. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 11 Perineal oedema between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 11 Perineal oedema between 3 and 14 days after giving birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Day 14					
The APT Study	3/108	2/101		100.0 %	1.40 [0.24, 8.22]
Total (95% CI)	**108**	**101**		**100.0 %**	**1.40 [0.24, 8.22]**
Total events: 3 (Gel pad), 2 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.38 (P = 0.71)					

Analysis 2.12. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 12 Perineal bruising within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 12 Perineal bruising within 24 hours of giving birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	66/108	61/101		100.0 %	1.01 [0.81, 1.26]
Total (95% CI)	**108**	**101**		**100.0 %**	**1.01 [0.81, 1.26]**
Total events: 66 (Gel pad), 61 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.11 (P = 0.92)					

Analysis 2.13. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 13 Perineal bruising between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 13 Perineal bruising between 24 and 72 hours after giving birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	71/108	65/101		100.0 %	1.02 [0.84, 1.25]
Total (95% CI)	**108**	**101**		**100.0 %**	**1.02 [0.84, 1.25]**
Total events: 71 (Gel pad), 65 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.21 (P = 0.83)					

Analysis 2.14. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 14 Perineal bruising between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 14 Perineal bruising between 3 and 14 days after giving birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Day 14					
The APT Study	2/108	4/101		100.0 %	0.47 [0.09, 2.50]
Total (95% CI)	**108**	**101**		**100.0 %**	**0.47 [0.09, 2.50]**
Total events: 2 (Gel pad), 4 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.89 (P = 0.37)					

Analysis 2.15. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 15 Perineal wound edges gaping.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 15 Perineal wound edges gaping

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 5 days after giving birth					
The APT Study	9/108	2/100		100.0 %	4.17 [0.92, 18.82]
Total (95% CI)	**108**	**100**		**100.0 %**	**4.17 [0.92, 18.82]**
Total events: 9 (Gel pad), 2 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.86 (P = 0.064)					

Analysis 2.16. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 16 Perineal wound infection.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 16 Perineal wound infection

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 5 days after giving birth					
The APT Study	0/108	4/100		100.0 %	0.10 [0.01, 1.89]
Total (95% CI)	**108**	**100**		**100.0 %**	**0.10 [0.01, 1.89]**
Total events: 0 (Gel pad), 4 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.53 (P = 0.13)					

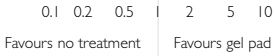
Analysis 2.17. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 17 Number of women breastfeeding at discharge from postpartum care.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 17 Number of women breastfeeding at discharge from postpartum care

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	55/106	56/100		100.0 %	0.93 [0.72, 1.19]
Total (95% CI)	**106**	**100**		**100.0 %**	**0.93 [0.72, 1.19]**
Total events: 55 (Gel pad), 56 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.59 (P = 0.55)					



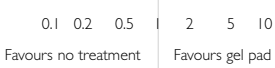
Analysis 2.18. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 18 Maternal views and experience with treatment.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 18 Maternal views and experience with treatment

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Satisfaction with overall perineal care (good + very good + excellent)					
The APT Study	99/106	84/100		100.0 %	1.11 [1.01, 1.23]
Total (95% CI)	**106**	**100**		**100.0 %**	**1.11 [1.01, 1.23]**
Total events: 99 (Gel pad), 84 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 2.09 (P = 0.037)					



Analysis 2.19. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 19 Pain that interferes with feeding 3 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 19 Pain that interferes with feeding 3 days after giving birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	21/107	31/100		100.0 %	0.63 [0.39, 1.03]
Total (95% CI)	**107**	**100**		**100.0 %**	**0.63 [0.39, 1.03]**
Total events: 21 (Gel pad), 31 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.86 (P = 0.063)					

Analysis 2.20. Comparison 2 Cooling treatment (cold gel pad) versus no treatment, Outcome 20 Pain that interferes with feeding 10 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 2 Cooling treatment (cold gel pad) versus no treatment

Outcome: 20 Pain that interferes with feeding 10 days after giving birth

Study or subgroup	Gel pad n/N	No treatment n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	12/106	12/100		100.0 %	0.94 [0.44, 2.00]
Total (95% CI)	**106**	**100**		**100.0 %**	**0.94 [0.44, 2.00]**
Total events: 12 (Gel pad), 12 (No treatment)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.15 (P = 0.88)					

Analysis 3.1. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 1 Perineal pain within 4 to 6 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 1 Perineal pain within 4 to 6 hours of giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Moderate + severe pain					
Steen 2000	6/22	13/27		100.0 %	0.57 [0.26, 1.24]
Total (95% CI)	**22**	**27**		**100.0 %**	**0.57 [0.26, 1.24]**
Total events: 6 (Ice pack), 13 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.42 (P = 0.16)					

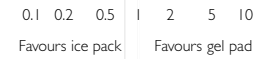
Analysis 3.2. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 2 Perineal pain within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 2 Perineal pain within 24 hours of giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Moderate + severe pain: all women					
Steen 2000	13/22	14/27		17.6 %	1.14 [0.69, 1.88]
The APT Study	55/107	59/108		82.4 %	0.94 [0.73, 1.21]
Subtotal (95% CI)	**129**	**135**		**100.0 %**	**0.98 [0.78, 1.22]**
Total events: 68 (Ice pack), 73 (Gel pad)					
Heterogeneity: Chi^2 = 0.45, df = 1 (P = 0.50); I^2 =0.0%					
Test for overall effect: Z = 0.21 (P = 0.83)					
2 Moderate + severe pain: primiparous women					
The APT Study	36/64	46/73		100.0 %	0.89 [0.68, 1.18]
Subtotal (95% CI)	**64**	**73**		**100.0 %**	**0.89 [0.68, 1.18]**



(*Continued* . . .)

(. . . *Continued*)

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Total events: 36 (Ice pack), 46 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.80 (P = 0.42)					
3 Moderate + severe pain: multiparous women					
The APT Study	19/43	13/35		100.0 %	1.19 [0.69, 2.05]
Subtotal (95% CI)	**43**	**35**		**100.0 %**	**1.19 [0.69, 2.05]**
Total events: 19 (Ice pack), 13 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.62 (P = 0.53)					
4 Moderate + severe pain: spontaneous vaginal birth					
The APT Study	39/80	39/74		100.0 %	0.93 [0.68, 1.26]
Subtotal (95% CI)	**80**	**74**		**100.0 %**	**0.93 [0.68, 1.26]**
Total events: 39 (Ice pack), 39 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.49 (P = 0.62)					
5 Moderate + severe pain: assisted vaginal birth					
The APT Study	16/27	20/34		100.0 %	1.01 [0.66, 1.53]
Subtotal (95% CI)	**27**	**34**		**100.0 %**	**1.01 [0.66, 1.53]**
Total events: 16 (Ice pack), 20 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.03 (P = 0.97)					

Analysis 3.3. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 3 Perineal pain between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 3 Perineal pain between 24 and 72 hours after giving birth

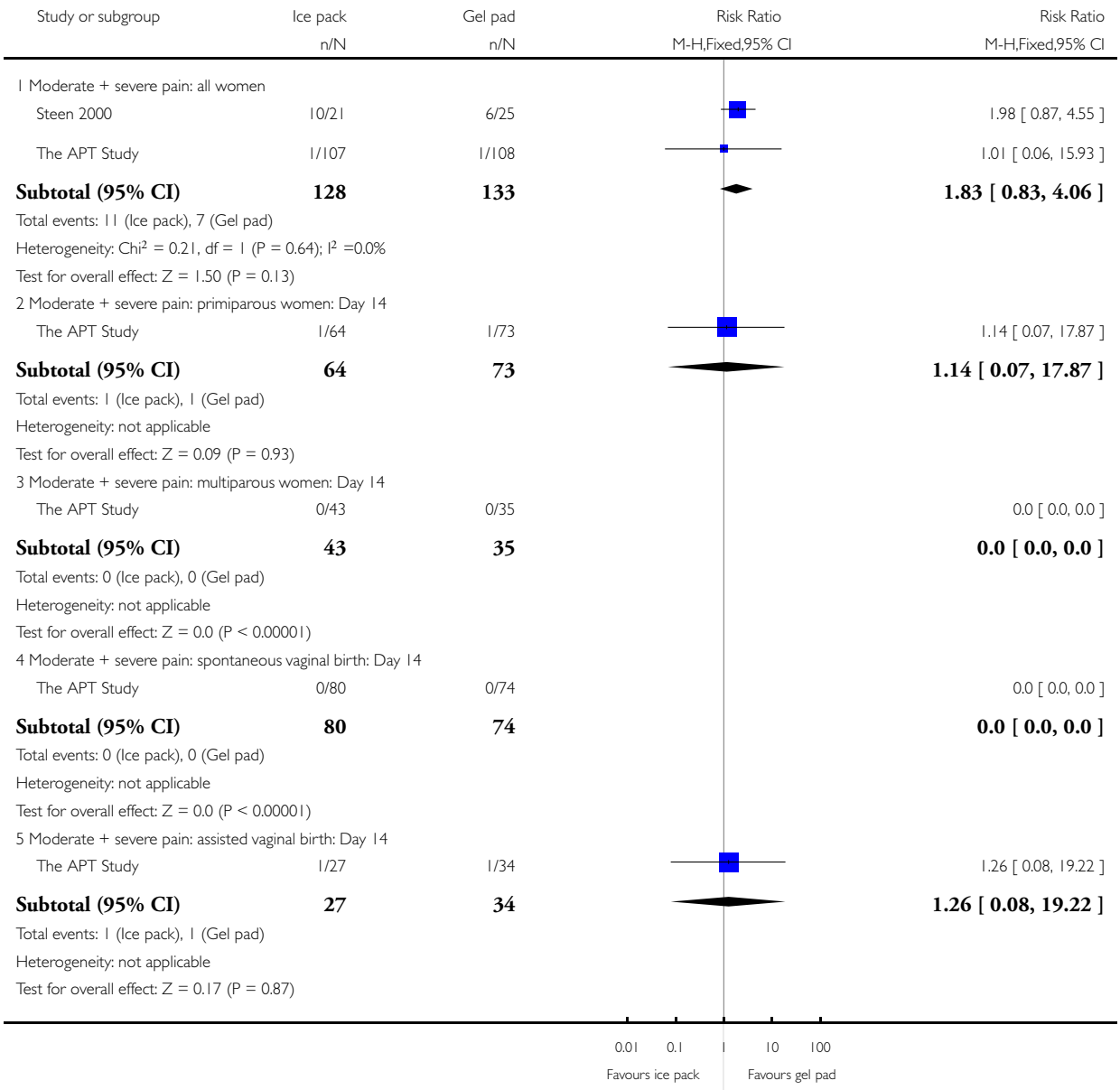
Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Moderate + severe pain: all women					
Steen 2000	9/22	7/26		16.3 %	1.52 [0.68, 3.41]
The APT Study	27/107	33/108		83.7 %	0.83 [0.54, 1.27]
Subtotal (95% CI)	**129**	**134**		**100.0 %**	**0.94 [0.64, 1.37]**
Total events: 36 (Ice pack), 40 (Gel pad)					
Heterogeneity: Chi² = 1.70, df = 1 (P = 0.19); I² =41%					
Test for overall effect: Z = 0.32 (P = 0.75)					
2 Moderate + severe pain: primiparous women					
The APT Study	19/64	24/73		100.0 %	0.90 [0.55, 1.49]
Subtotal (95% CI)	**64**	**73**		**100.0 %**	**0.90 [0.55, 1.49]**
Total events: 19 (Ice pack), 24 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.40 (P = 0.69)					
3 Moderate + severe pain: multiparous women					
The APT Study	8/43	9/35		100.0 %	0.72 [0.31, 1.68]
Subtotal (95% CI)	**43**	**35**		**100.0 %**	**0.72 [0.31, 1.68]**
Total events: 8 (Ice pack), 9 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.75 (P = 0.45)					
4 Moderate + severe pain: spontaneous vaginal birth					
The APT Study	17/80	20/74		100.0 %	0.79 [0.45, 1.38]
Subtotal (95% CI)	**80**	**74**		**100.0 %**	**0.79 [0.45, 1.38]**
Total events: 17 (Ice pack), 20 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.84 (P = 0.40)					
5 Moderate + severe pain: assisted vaginal birth					
The APT Study	10/27	13/34		100.0 %	0.97 [0.50, 1.86]
Subtotal (95% CI)	**27**	**34**		**100.0 %**	**0.97 [0.50, 1.86]**
Total events: 10 (Ice pack), 13 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.10 (P = 0.92)					

Analysis 3.4. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 4 Perineal pain between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 4 Perineal pain between 3 and 14 days after giving birth



Analysis 3.5. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 5 Pain associated with activities of daily living (walking) within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 5 Pain associated with activities of daily living (walking) within 24 hours of giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	95/105	101/107		100.0 %	0.96 [0.89, 1.04]
Total (95% CI)	**105**	**107**		**100.0 %**	**0.96 [0.89, 1.04]**
Total events: 95 (Ice pack), 101 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.07 (P = 0.28)					

Analysis 3.6. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 6 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 6 Pain associated with activities of daily living (walking) between 24 and 72 hours of giving birth

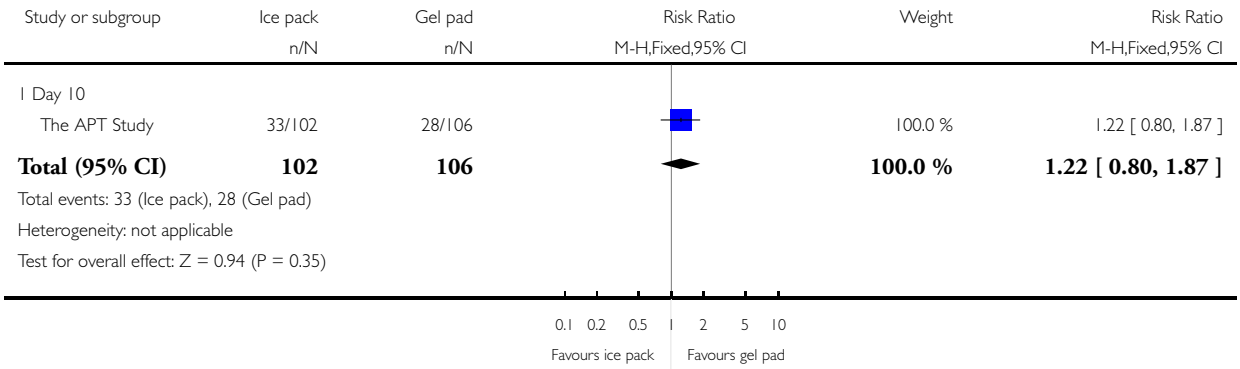
Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	82/103	91/107		100.0 %	0.94 [0.83, 1.06]
Total (95% CI)	**103**	**107**		**100.0 %**	**0.94 [0.83, 1.06]**
Total events: 82 (Ice pack), 91 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.03 (P = 0.30)					

Analysis 3.7. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 7 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 7 Pain associated with activities of daily living (walking) between 3 and 14 days after giving birth

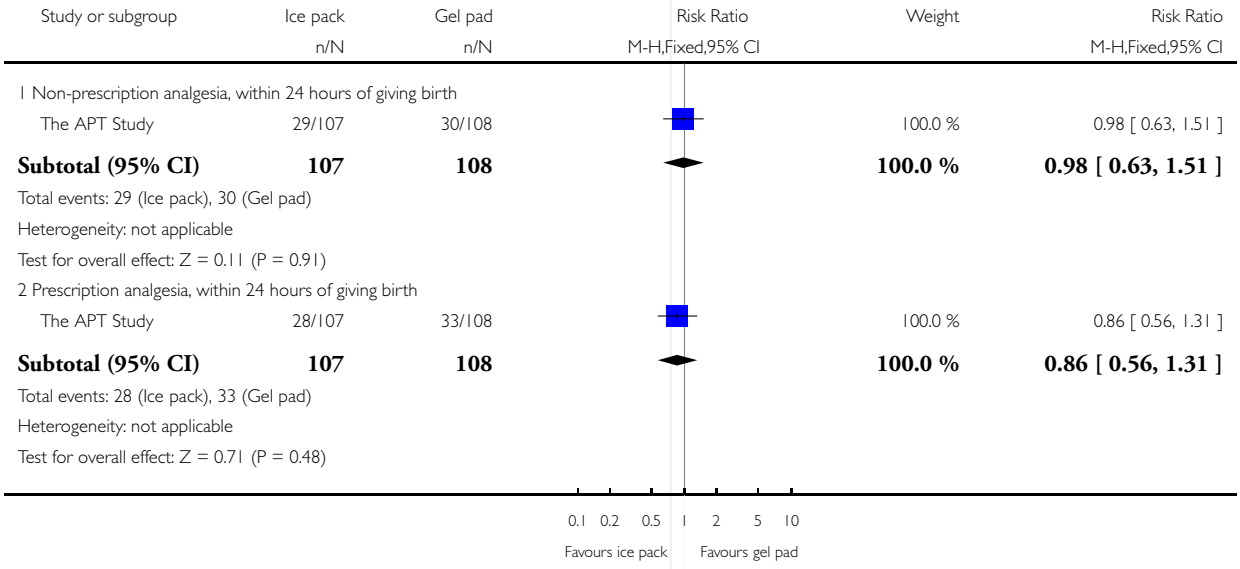


Analysis 3.8. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 8 Additional analgesia for relief of perineal pain: in hospital.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 8 Additional analgesia for relief of perineal pain: in hospital

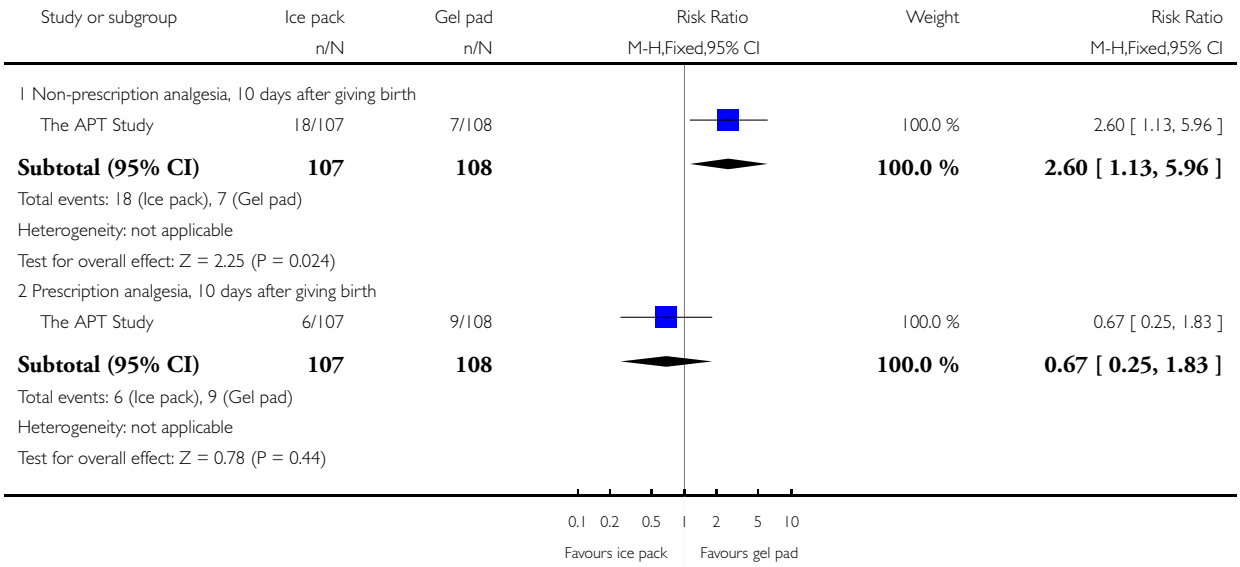


Analysis 3.9. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 9 Additional analgesia for relief of perineal pain: after hospital discharge.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 9 Additional analgesia for relief of perineal pain: after hospital discharge



Analysis 3.10. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 10 Perineal oedema within 4 to 6 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 10 Perineal oedema within 4 to 6 hours of giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Steen 2000	17/22	15/27		100.0 %	1.39 [0.93, 2.09]
Total (95% CI)	**22**	**27**		**100.0 %**	**1.39 [0.93, 2.09]**
Total events: 17 (Ice pack), 15 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.59 (P = 0.11)					

Analysis 3.11. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 11 Perineal oedema within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 11 Perineal oedema within 24 hours of giving birth

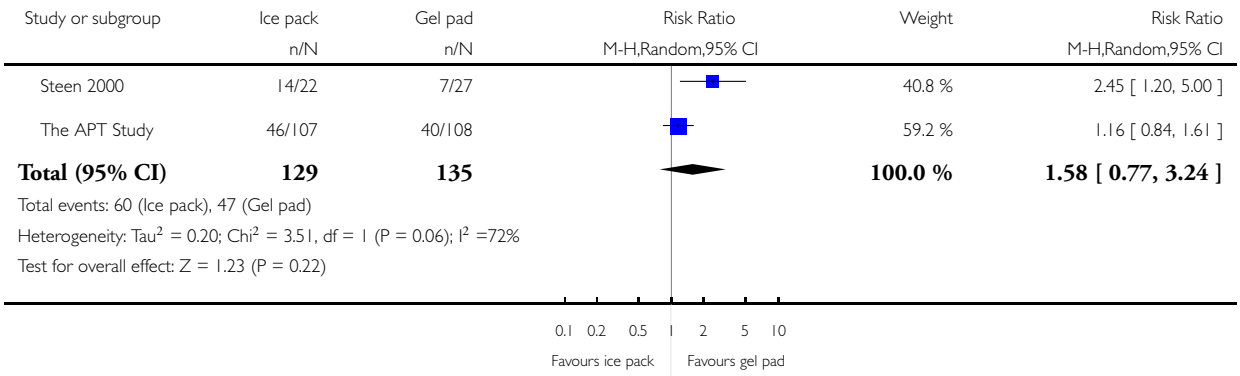
Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Steen 2000	16/22	19/27		17.6 %	1.03 [0.73, 1.47]
The APT Study	76/107	80/108		82.4 %	0.96 [0.81, 1.13]
Total (95% CI)	**129**	**135**		**100.0 %**	**0.97 [0.84, 1.13]**
Total events: 92 (Ice pack), 99 (Gel pad)					
Heterogeneity: Chi^2 = 0.14, df = 1 (P = 0.71); I^2 =0.0%					
Test for overall effect: Z = 0.37 (P = 0.71)					

Analysis 3.12. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 12 Perineal oedema between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 12 Perineal oedema between 24 and 72 hours after giving birth

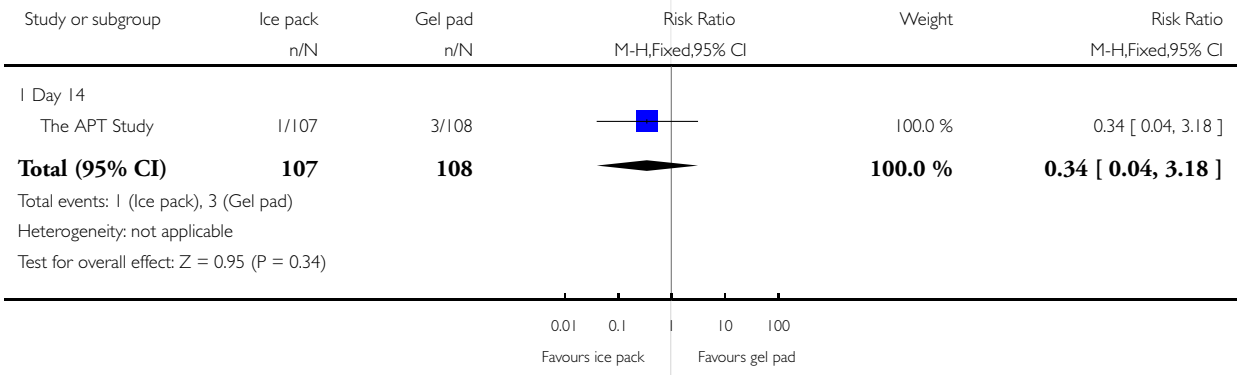


Analysis 3.13. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 13 Perineal oedema 3 to 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 13 Perineal oedema 3 to 14 days after giving birth



Analysis 3.14. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 14 Perineal bruising within 4 to 6 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 14 Perineal bruising within 4 to 6 hours of giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Steen 2000	7/22	7/27		100.0 %	1.23 [0.51, 2.97]
Total (95% CI)	**22**	**27**		**100.0 %**	**1.23 [0.51, 2.97]**
Total events: 7 (Ice pack), 7 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.45 (P = 0.65)					

Analysis 3.15. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 15 Perineal bruising within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 15 Perineal bruising within 24 hours of giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Steen 2000	17/22	21/27		22.3 %	0.99 [0.73, 1.35]
The APT Study	61/107	66/108		77.7 %	0.93 [0.75, 1.17]
Total (95% CI)	**129**	**135**		**100.0 %**	**0.95 [0.79, 1.14]**
Total events: 78 (Ice pack), 87 (Gel pad)					
Heterogeneity: Chi^2 = 0.11, df = 1 (P = 0.74); I^2 =0.0%					
Test for overall effect: Z = 0.58 (P = 0.56)					

Analysis 3.16. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 16 Perineal bruising between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 16 Perineal bruising between 24 and 72 hours after giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Steen 2000	18/22	18/27		43.3 %	1.23 [0.88, 1.71]
The APT Study	61/107	71/108		56.7 %	0.87 [0.70, 1.07]
Total (95% CI)	**129**	**135**		**100.0 %**	**1.01 [0.72, 1.42]**
Total events: 79 (Ice pack), 89 (Gel pad)					
Heterogeneity: $Tau^2 = 0.04$; $Chi^2 = 3.07$, df = 1 (P = 0.08); $I^2 = 67\%$					
Test for overall effect: Z = 0.04 (P = 0.96)					

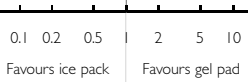
Analysis 3.17. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 17 Perineal bruising 3 to 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 17 Perineal bruising 3 to 14 days after giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Day 14					
The APT Study	3/107	2/108		100.0 %	1.51 [0.26, 8.88]
Total (95% CI)	**107**	**108**		**100.0 %**	**1.51 [0.26, 8.88]**
Total events: 3 (Ice pack), 2 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.46 (P = 0.65)					

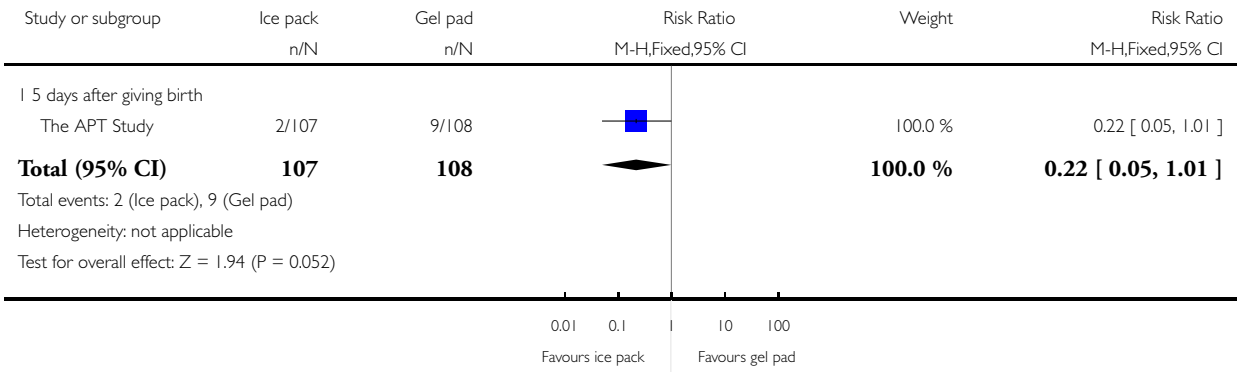


Analysis 3.18. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 18 Perineal wound edges gaping.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 18 Perineal wound edges gaping

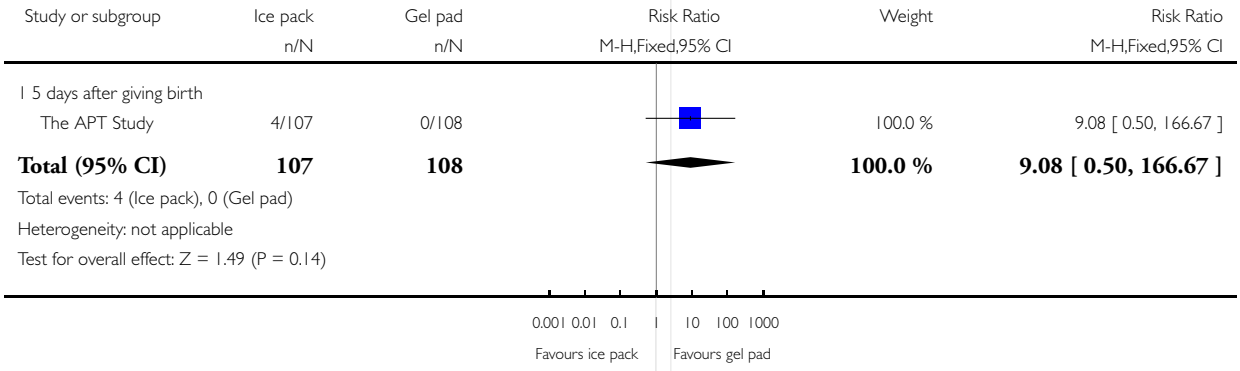


Analysis 3.19. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 19 Perineal wound infection.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 19 Perineal wound infection

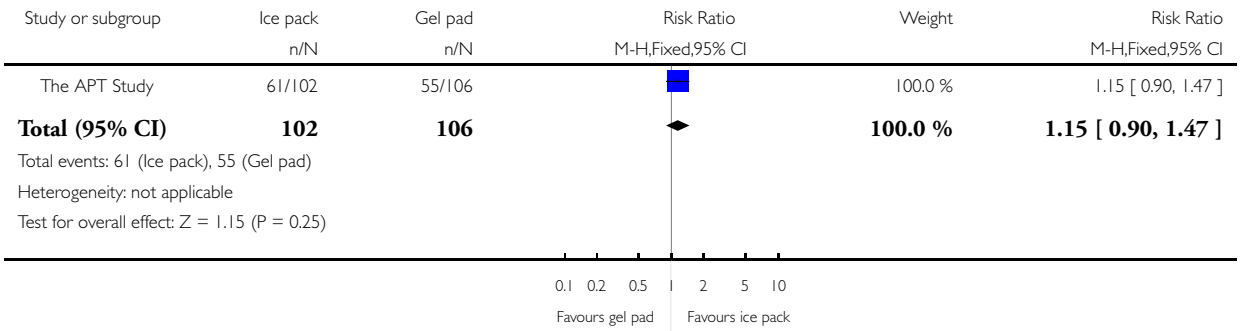


Analysis 3.20. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 20 Number of women breastfeeding at discharge from postpartum care.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 20 Number of women breastfeeding at discharge from postpartum care

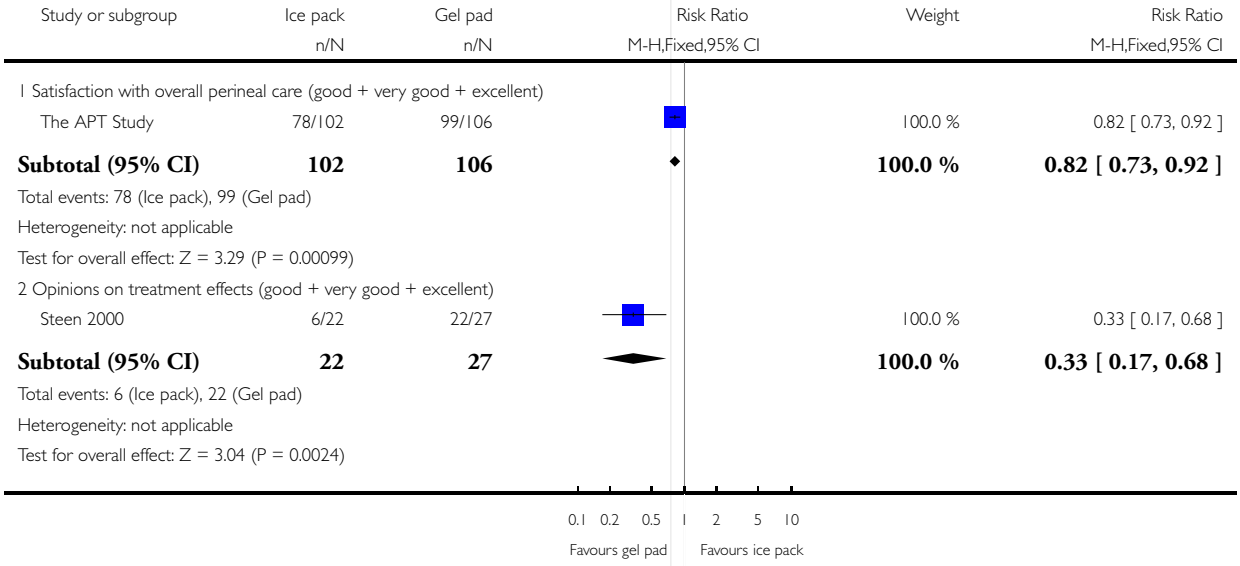


Analysis 3.21. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 21 Maternal views and experience with treatment.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 21 Maternal views and experience with treatment



Analysis 3.22. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 22 Pain that interferes with feeding 3 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 22 Pain that interferes with feeding 3 days after giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	26/103	21/107		100.0 %	1.29 [0.77, 2.14]
Total (95% CI)	**103**	**107**		**100.0 %**	**1.29 [0.77, 2.14]**
Total events: 26 (Ice pack), 21 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.97 (P = 0.33)					

Analysis 3.23. Comparison 3 Comparison of two cooling treatments (ice pack versus cold gel pad), Outcome 23 Pain that interferes with feeding 10 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 3 Comparison of two cooling treatments (ice pack versus cold gel pad)

Outcome: 23 Pain that interferes with feeding 10 days after giving birth

Study or subgroup	Ice pack n/N	Gel pad n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
The APT Study	13/102	12/106		100.0 %	1.13 [0.54, 2.35]
Total (95% CI)	**102**	**106**		**100.0 %**	**1.13 [0.54, 2.35]**
Total events: 13 (Ice pack), 12 (Gel pad)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.32 (P = 0.75)					

Analysis 4.1. Comparison 4 Cooling treatment versus pulsed electromagnetic energy, Outcome 1 Perineal pain 24 to 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 4 Cooling treatment versus pulsed electromagnetic energy

Outcome: 1 Perineal pain 24 to 72 hours after giving birth

Study or subgroup	Ice pack n/N	PET n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Moderate + severe + unbearable					
Gallie 2003	28/50	5/50		100.0 %	5.60 [2.35, 13.33]
Total (95% CI)	**50**	**50**		**100.0 %**	**5.60 [2.35, 13.33]**
Total events: 28 (Ice pack), 5 (PET)					
Heterogeneity: not applicable					
Test for overall effect: Z = 3.89 (P = 0.000099)					

Analysis 4.2. Comparison 4 Cooling treatment versus pulsed electromagnetic energy, Outcome 2 Additional analgesia for relief of perineal pain: in hospital.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 4 Cooling treatment versus pulsed electromagnetic energy

Outcome: 2 Additional analgesia for relief of perineal pain: in hospital

Study or subgroup	Ice pack n/N	PET n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Diclofenac					
Gallie 2003	16/50	4/50		100.0 %	4.00 [1.44, 11.13]
Total (95% CI)	**50**	**50**		**100.0 %**	**4.00 [1.44, 11.13]**
Total events: 16 (Ice pack), 4 (PET)					
Heterogeneity: not applicable					
Test for overall effect: Z = 2.66 (P = 0.0079)					

Analysis 5.1. Comparison 5 Cooling treatment versus hamamelis water, Outcome 1 Perineal pain within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 1 Perineal pain within 24 hours of giving birth

Study or subgroup	Ice pack n/N	Hamamelis water n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 None or mild pain relief					
Moore 1989	27/69	24/77		100.0 %	1.26 [0.81, 1.96]
Total (95% CI)	**69**	**77**		**100.0 %**	**1.26 [0.81, 1.96]**
Total events: 27 (Ice pack), 24 (Hamamelis water)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.01 (P = 0.31)					

Analysis 5.2. Comparison 5 Cooling treatment versus hamamelis water, Outcome 2 Perineal pain between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 2 Perineal pain between 24 and 72 hours after giving birth

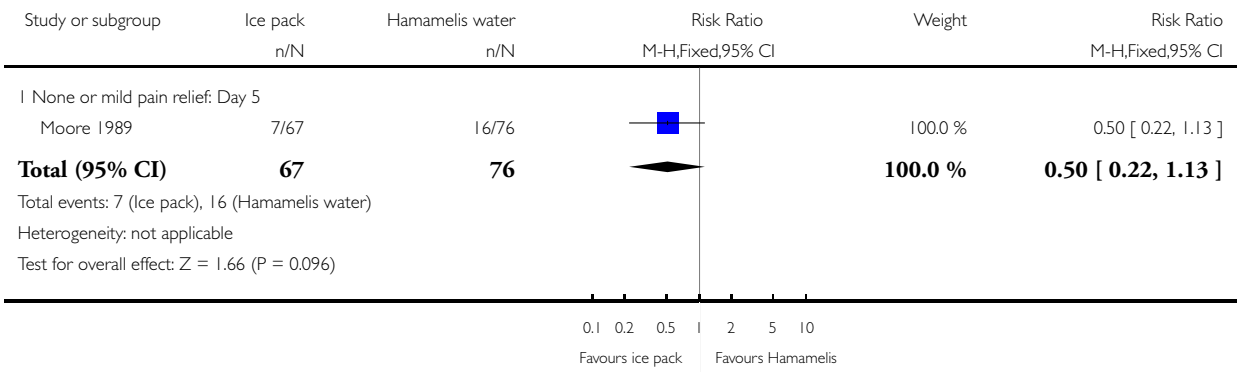
Study or subgroup	Ice pack n/N	Hamamelis water n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 None or mild pain relief					
Moore 1989	13/67	22/77		100.0 %	0.68 [0.37, 1.24]
Total (95% CI)	**67**	**77**		**100.0 %**	**0.68 [0.37, 1.24]**
Total events: 13 (Ice pack), 22 (Hamamelis water)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.26 (P = 0.21)					

Analysis 5.3. Comparison 5 Cooling treatment versus hamamelis water, Outcome 3 Perineal pain between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 3 Perineal pain between 3 and 14 days after giving birth

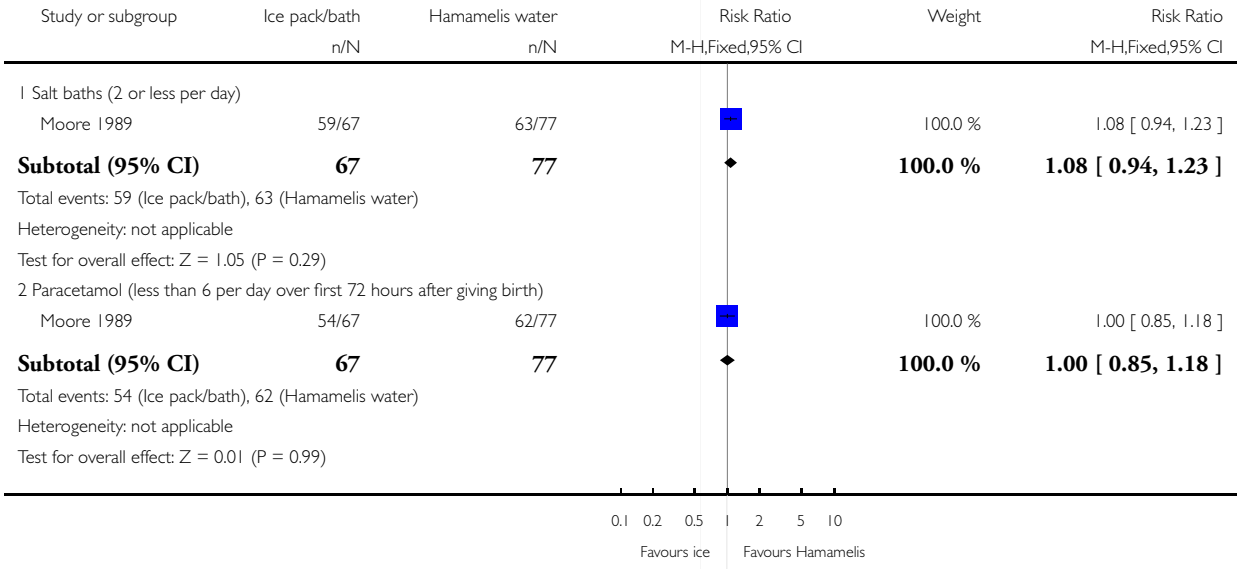


Analysis 5.4. Comparison 5 Cooling treatment versus hamamelis water, Outcome 4 Additional analgesia for relief of perineal pain: in hospital.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 4 Additional analgesia for relief of perineal pain: in hospital

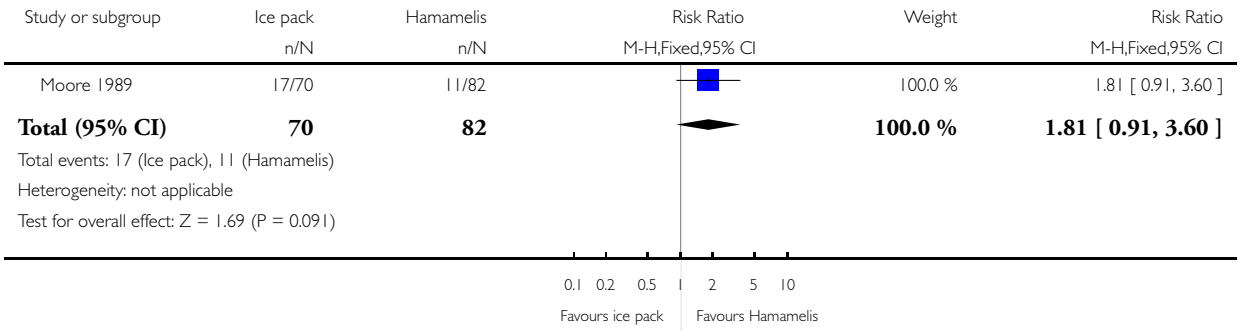


Analysis 5.5. Comparison 5 Cooling treatment versus hamamelis water, Outcome 5 Perineal oedema within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 5 Perineal oedema within 24 hours of giving birth

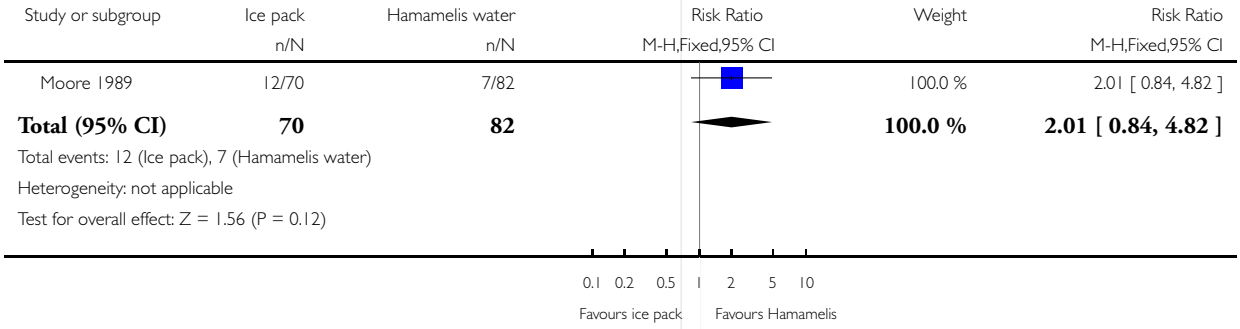


Analysis 5.6. Comparison 5 Cooling treatment versus hamamelis water, Outcome 6 Perineal oedema between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 6 Perineal oedema between 24 and 72 hours after giving birth

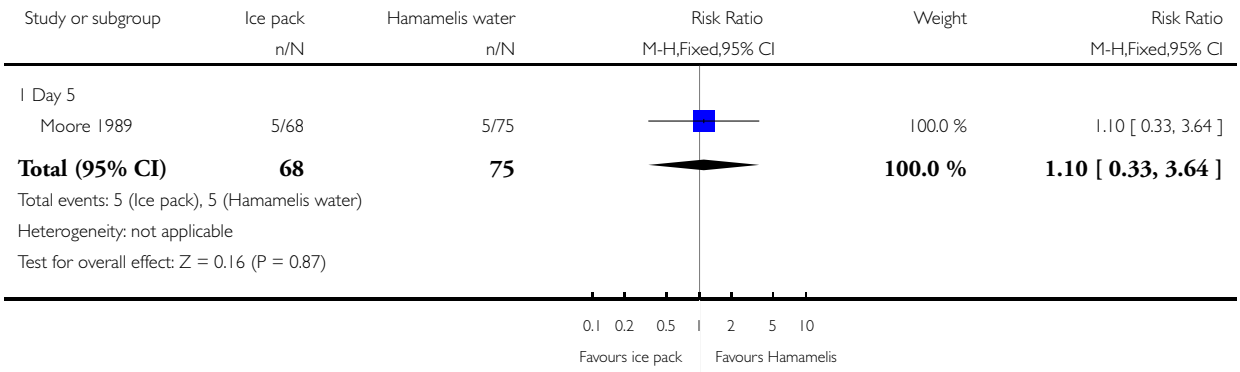


Analysis 5.7. Comparison 5 Cooling treatment versus hamamelis water, Outcome 7 Perineal oedema between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 7 Perineal oedema between 3 and 14 days after giving birth

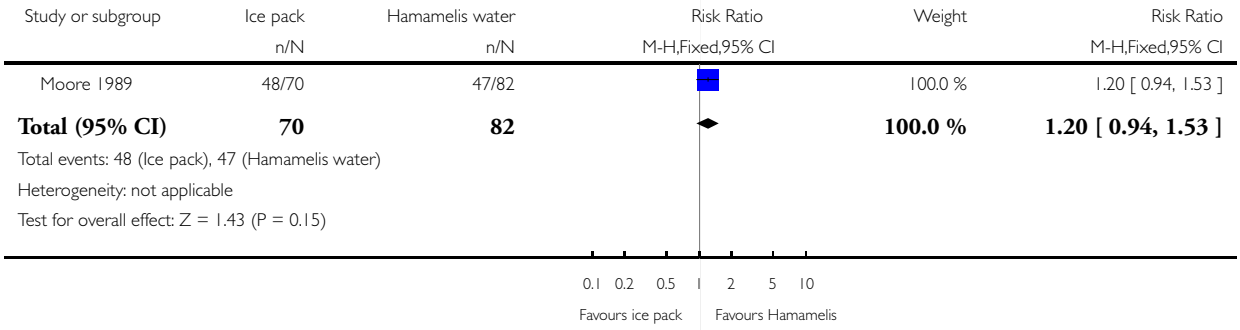


Analysis 5.8. Comparison 5 Cooling treatment versus hamamelis water, Outcome 8 Perineal bruising within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 8 Perineal bruising within 24 hours of giving birth



Analysis 5.9. Comparison 5 Cooling treatment versus hamamelis water, Outcome 9 Perineal bruising between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 9 Perineal bruising between 24 and 72 hours after giving birth

Study or subgroup	Ice pack n/N	Hamamelis n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Moore 1989	37/70	49/82		100.0 %	0.88 [0.67, 1.17]
Total (95% CI)	**70**	**82**		**100.0 %**	**0.88 [0.67, 1.17]**
Total events: 37 (Ice pack), 49 (Hamamelis)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.85 (P = 0.40)					

Analysis 5.10. Comparison 5 Cooling treatment versus hamamelis water, Outcome 10 Perineal bruising between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 5 Cooling treatment versus hamamelis water

Outcome: 10 Perineal bruising between 3 and 14 days after giving birth

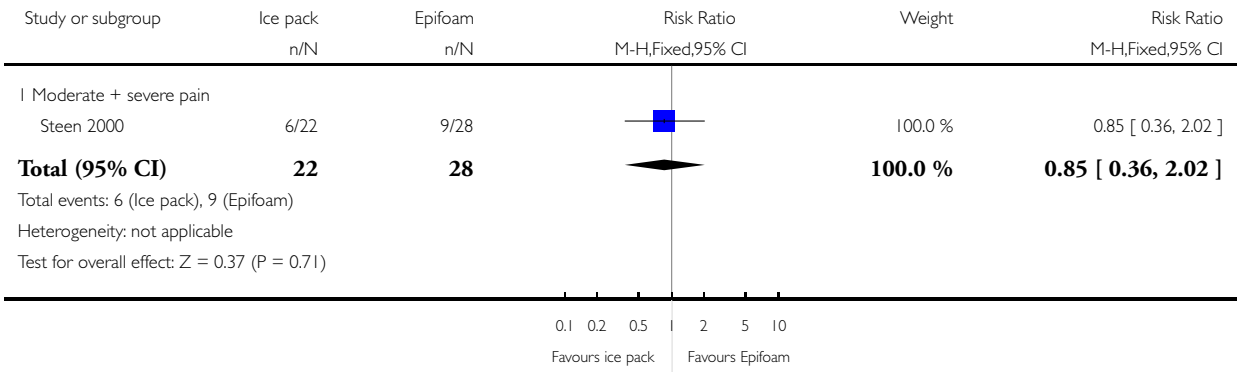
Study or subgroup	Ice pack n/N	Hamamelis n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 Day 5					
Moore 1989	23/68	21/75		100.0 %	1.21 [0.74, 1.98]
Total (95% CI)	**68**	**75**		**100.0 %**	**1.21 [0.74, 1.98]**
Total events: 23 (Ice pack), 21 (Hamamelis)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.75 (P = 0.45)					

Analysis 6.1. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 1 Perineal pain wthin 4 to 6 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 1 Perineal pain wthin 4 to 6 hours of giving birth

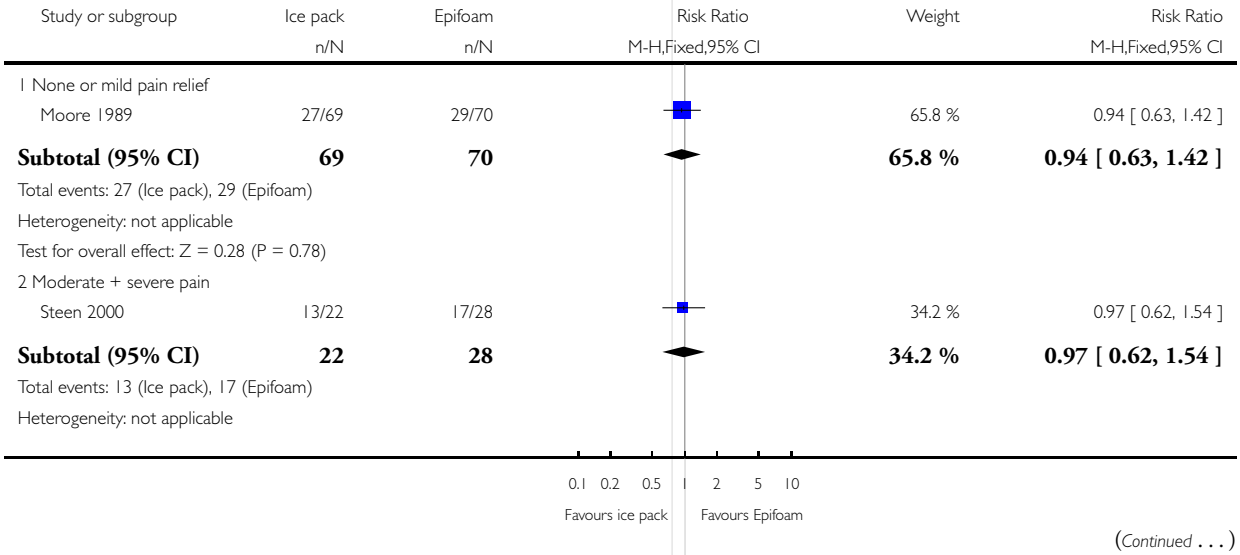


Analysis 6.2. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 2 Perineal pain within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 2 Perineal pain within 24 hours of giving birth



(*Continued . . .*)

(. . . *Continued*)

Study or subgroup	Ice pack n/N	Epifoam n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Test for overall effect: Z = 0.12 (P = 0.91)					
Total (95% CI)	**91**	**98**		**100.0 %**	**0.95 [0.70, 1.30]**
Total events: 40 (Ice pack), 46 (Epifoam)					
Heterogeneity: Chi^2 = 0.01, df = 1 (P = 0.92); I^2 =0.0%					
Test for overall effect: Z = 0.30 (P = 0.77)					

Analysis 6.3. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 3 Perineal pain between 24 and 72 hours after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 3 Perineal pain between 24 and 72 hours after giving birth

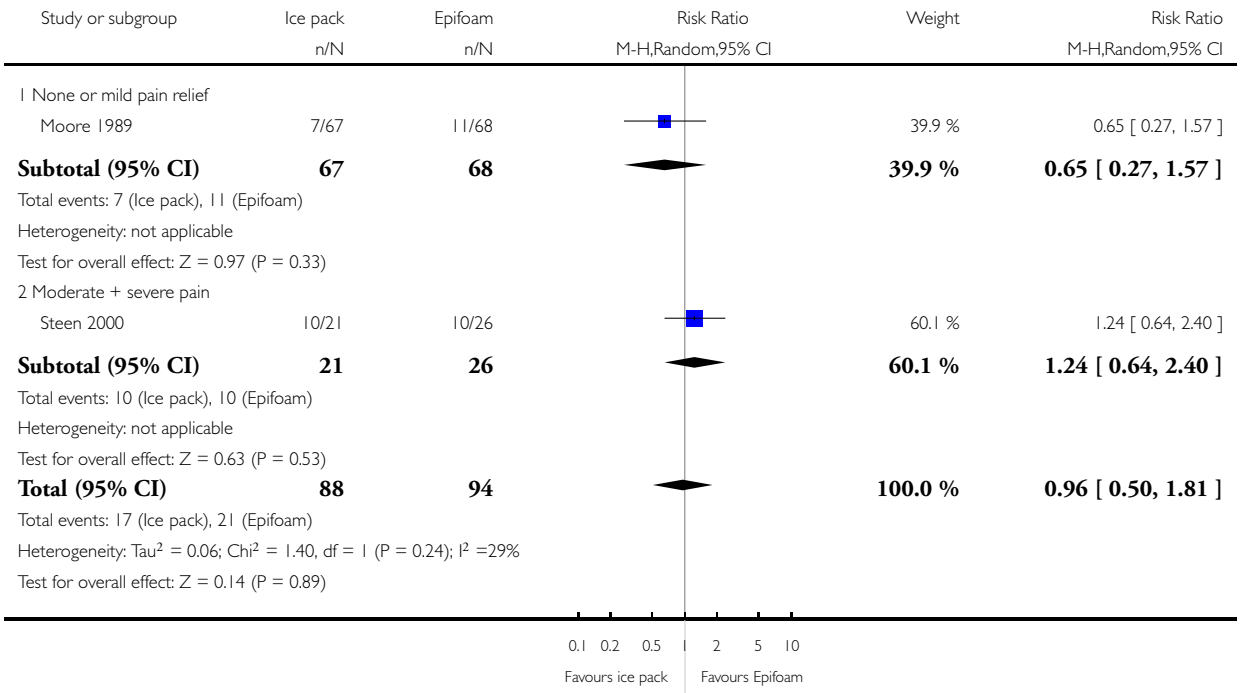
Study or subgroup	Ice pack n/N	Epifoam n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
1 None or mild pain relief					
Moore 1989	13/67	22/70		71.0 %	0.62 [0.34, 1.12]
Subtotal (95% CI)	**67**	**70**		**71.0 %**	**0.62 [0.34, 1.12]**
Total events: 13 (Ice pack), 22 (Epifoam)					
Heterogeneity: not applicable					
Test for overall effect: Z = 1.58 (P = 0.11)					
2 Moderate + severe pain					
Steen 2000	9/22	10/28		29.0 %	1.15 [0.57, 2.32]
Subtotal (95% CI)	**22**	**28**		**29.0 %**	**1.15 [0.57, 2.32]**
Total events: 9 (Ice pack), 10 (Epifoam)					
Heterogeneity: not applicable					
Test for overall effect: Z = 0.38 (P = 0.71)					
Total (95% CI)	**89**	**98**		**100.0 %**	**0.77 [0.49, 1.21]**
Total events: 22 (Ice pack), 32 (Epifoam)					
Heterogeneity: Chi^2 = 1.74, df = 1 (P = 0.19); I^2 =42%					
Test for overall effect: Z = 1.12 (P = 0.26)					

Analysis 6.4. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 4 Perineal pain between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 4 Perineal pain between 3 and 14 days after giving birth

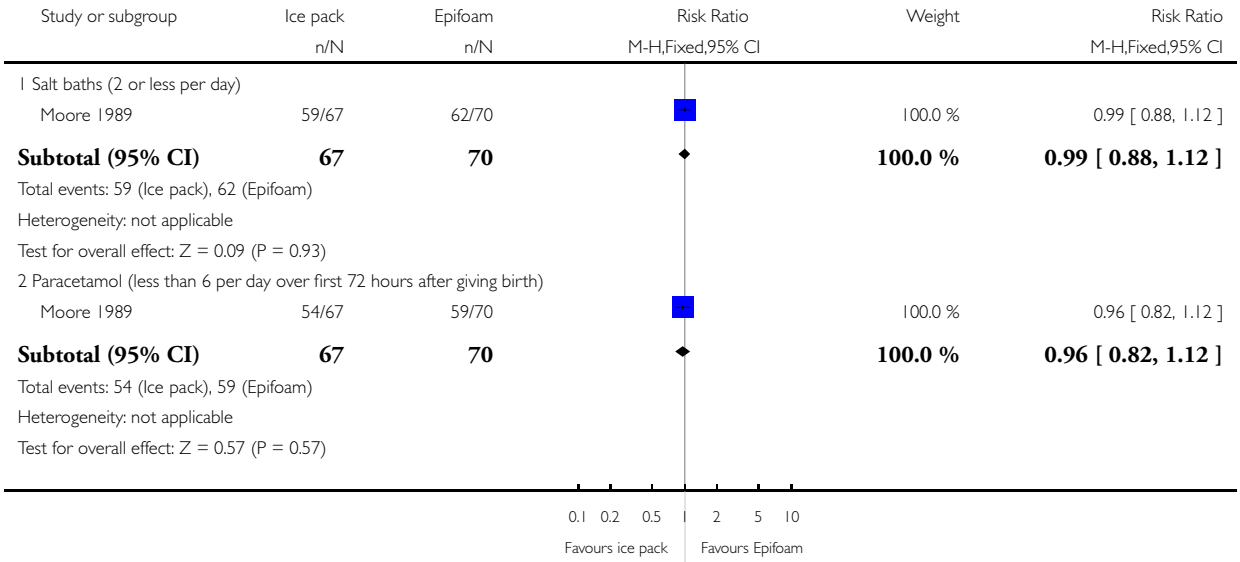


Analysis 6.5. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 5 Additional analgesia for relief of perineal pain: in hospital.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 5 Additional analgesia for relief of perineal pain: in hospital

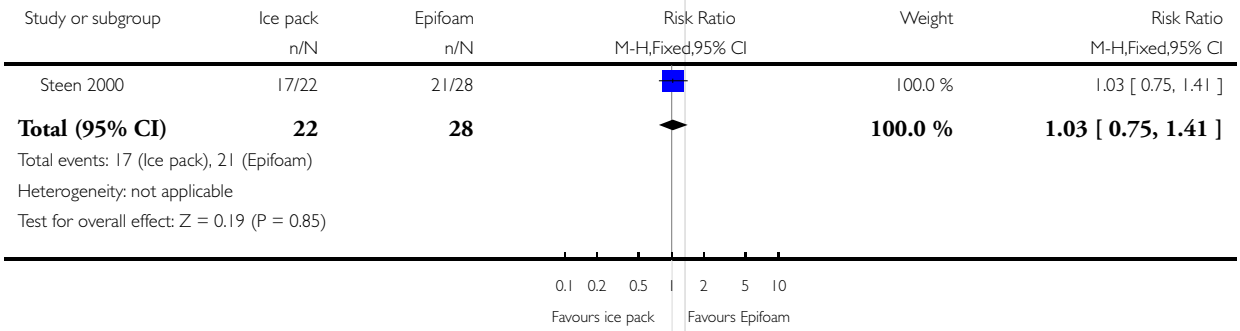


Analysis 6.6. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 6 Perineal oedema within 4 to 6 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 6 Perineal oedema within 4 to 6 hours of giving birth



Analysis 6.7. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 7 Perineal oedema within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 7 Perineal oedema within 24 hours of giving birth

Study or subgroup	Ice pack n/N	Epifoam n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Moore 1989	17/70	13/76		41.5 %	1.42 [0.74, 2.71]
Steen 2000	16/22	20/28		58.5 %	1.02 [0.72, 1.44]
Total (95% CI)	**92**	**104**		**100.0 %**	**1.18 [0.84, 1.68]**

Total events: 33 (Ice pack), 33 (Epifoam)

Heterogeneity: Chi^2 = 1.03, df = 1 (P = 0.31); I^2 =3%

Test for overall effect: Z = 0.95 (P = 0.34)

Analysis 6.8. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 8 Perineal oedema between 24 and 72 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 8 Perineal oedema between 24 and 72 hours of giving birth

Study or subgroup	Ice pack n/N	Epifoam n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Moore 1989	12/70	6/76		36.5 %	2.17 [0.86, 5.47]
Steen 2000	14/22	17/28		63.5 %	1.05 [0.68, 1.62]
Total (95% CI)	**92**	**104**		**100.0 %**	**1.37 [0.64, 2.91]**

Total events: 26 (Ice pack), 23 (Epifoam)

Heterogeneity: Tau^2 = 0.19; Chi^2 = 2.37, df = 1 (P = 0.12); I^2 =58%

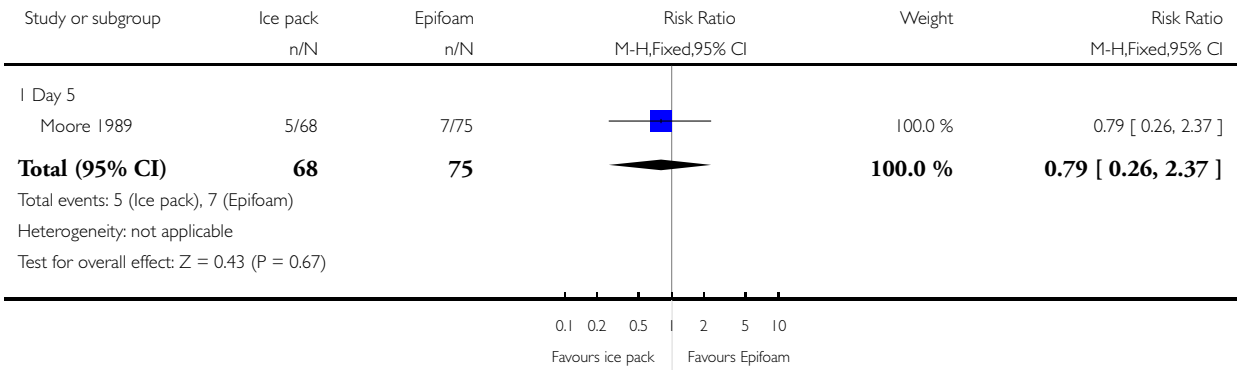
Test for overall effect: Z = 0.81 (P = 0.42)

Analysis 6.9. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 9 Perineal oedema between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 9 Perineal oedema between 3 and 14 days after giving birth

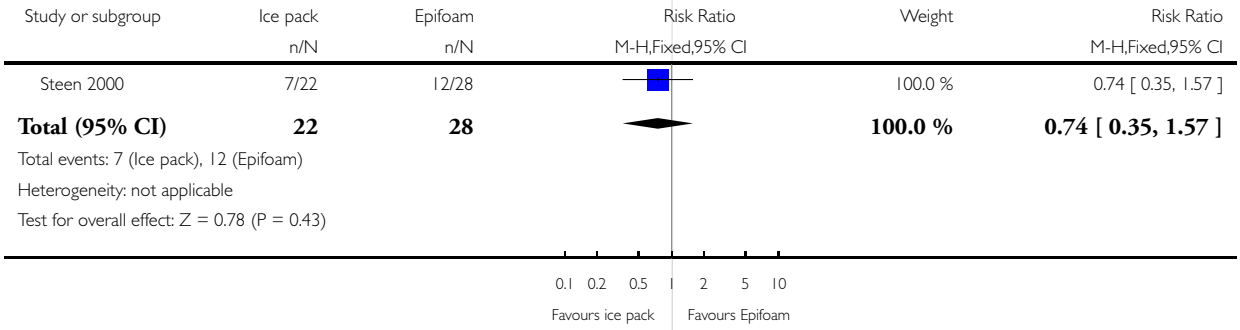


Analysis 6.10. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 10 Perineal bruising within 4 to 6 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 10 Perineal bruising within 4 to 6 hours of giving birth



Analysis 6.11. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 11 Perineal bruising within 24 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 11 Perineal bruising within 24 hours of giving birth

Study or subgroup	Ice pack n/N	Epifoam n/N	Risk Ratio M-H,Random,95% CI	Weight	Risk Ratio M-H,Random,95% CI
Moore 1989	48/70	32/76		49.3 %	1.63 [1.20, 2.22]
Steen 2000	17/22	26/28		50.7 %	0.83 [0.65, 1.07]
Total (95% CI)	**92**	**104**		**100.0 %**	**1.16 [0.55, 2.43]**

Total events: 65 (Ice pack), 58 (Epifoam)

Heterogeneity: $Tau^2 = 0.27$; $Chi^2 = 14.08$, df = 1 (P = 0.00017); $I^2 = 93\%$

Test for overall effect: Z = 0.39 (P = 0.70)

Analysis 6.12. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 12 Perineal bruising between 24 and 72 hours of giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

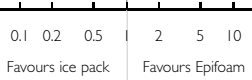
Outcome: 12 Perineal bruising between 24 and 72 hours of giving birth

Study or subgroup	Ice pack n/N	Epifoam n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
Moore 1989	37/70	35/76		60.4 %	1.15 [0.83, 1.59]
Steen 2000	18/22	25/28		39.6 %	0.92 [0.72, 1.16]
Total (95% CI)	**92**	**104**		**100.0 %**	**1.06 [0.84, 1.32]**

Total events: 55 (Ice pack), 60 (Epifoam)

Heterogeneity: $Chi^2 = 1.65$, df = 1 (P = 0.20); $I^2 = 39\%$

Test for overall effect: Z = 0.48 (P = 0.63)

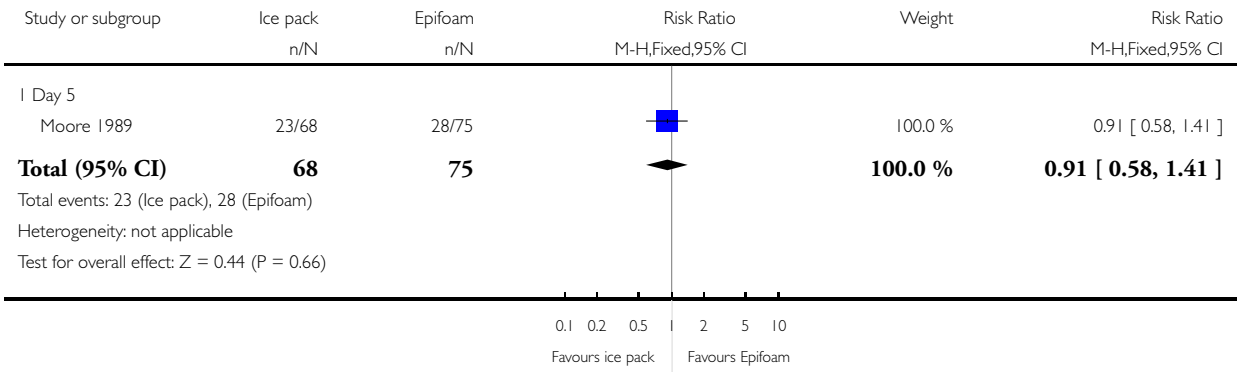


Analysis 6.13. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 13 Perineal bruising between 3 and 14 days after giving birth.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 13 Perineal bruising between 3 and 14 days after giving birth

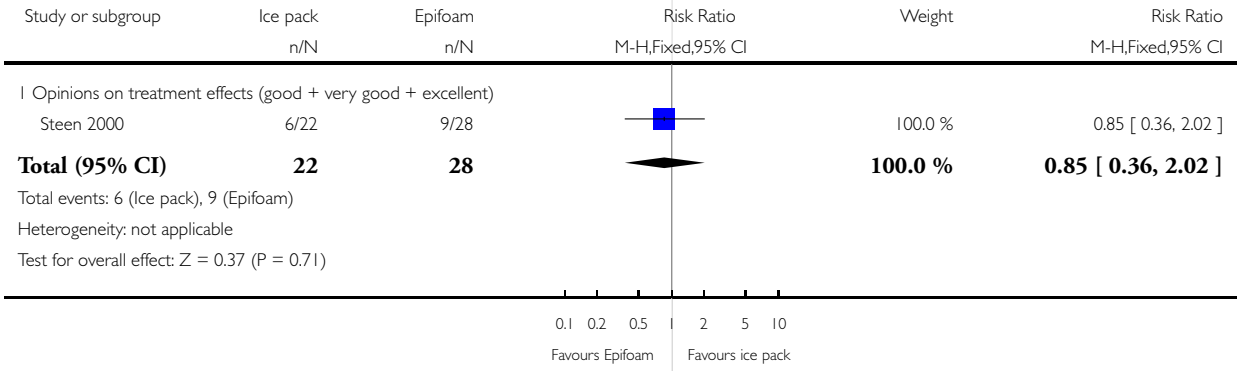


Analysis 6.14. Comparison 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam), Outcome 14 Maternal views and experience with treatment.

Review: Local cooling for relieving pain from perineal trauma sustained during childbirth

Comparison: 6 Cooling treatment versus pramoxine with hydrocortisone (Epifoam)

Outcome: 14 Maternal views and experience with treatment



WHAT'S NEW

Last assessed as up-to-date: 10 July 2007.

10 November 2008	Amended	Contact details updated.

HISTORY

Protocol first published: Issue 1, 2007

Review first published: Issue 4, 2007

18 February 2008	Amended	Converted to new review format.
11 July 2007	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

Chris East compiled the review, with input from Paul Marchant, Lisa Begg, Naomi Henshall and Karen Wallace.

DECLARATIONS OF INTEREST

Paul Marchant collaborated in a randomised controlled trial comparing the effectiveness of two cooling treatments for the relief of perineal pain following childbirth.

SOURCES OF SUPPORT

Internal sources

- Queensland Health Nursing Research Grant, Australia.

External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Episiotomy; Combined Modality Therapy [methods]; Hyperthermia, Induced [methods]; Hypothermia, Induced [*methods]; Magnetics [therapeutic use]; Pain [*therapy]; Perineum [*injuries]; Randomized Controlled Trials as Topic

MeSH check words

Female; Humans; Pregnancy